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Health Care Financing Review

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Summary of a conference on national health expenditures accounting

Health Care Financing Administration

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The mission of the Health Care Financing Administration is to promote the timely delivery of appropriate, quality health care to its beneficiaries—approximately 50 million of the Nation's aged, disabled, and poor. The agency must also ensure that program beneficiaries are aware of the services for which they are eligible, that those services are accessible and of high quality, and that agency policies and actions promote efficiency and quality within the total health care delivery system.

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The editorial policy of the *Health Care Financing Review* is comparable to that of other professional journals. The Executive Editor decides which of the submitted articles are relevant to the health care financing field in general and to the Health Care Financing Administration in particular. *Review* readership is encouraged to submit appropriate manuscripts for consideration.

The Associate Editors manage the peer review process and are responsible for the professional quality of *Review* articles. All articles of interest are sent to a panel of peers with expertise in the subject areas addressed, and they review articles in terms of substance, originality, validity, clarity, and significance. Their comments, along with those of the Associate Editors, are transmitted to the authors. Authors whose manuscripts are accepted for publication may be asked to make revisions based on these critiques.

The Managing Editor has responsibility for the publications standards of the *Review* and the editorial quality of the articles published, and the editorial staff work with authors on preparing their articles for publication.

The *Review* is published on a quarterly basis and each issue represents a balance between contributors from inside and outside the government. Some selective scheduling for publication is necessary because more articles are usually accepted each quarter than can be published in any given issue. However, we will publish all articles of interest that are accepted through the peer review process as space is available.

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Health status and utilization: Differences by Medicaid coverage and income

by Judith D. Kasper

By several measures of health status, the Medicaid population is in worse health than are persons without Medicaid. In addition, poor persons without Medicaid coverage are in poorer health than those who are not poor. Use of health services among those in poor health shows Medicaid eligibles use services at a level comparable to those who are not poor and without Medicaid. Among the poor without Medicaid, the reduced likelihood of seeing a physician and purchasing a prescribed drug indicates the importance of Medicaid coverage in obtaining access to care.

Introduction

The Medicaid program was enacted in 1965 to provide access to mainstream health care for the poor. Considerable research since then suggests that significant gains in access to care have been achieved for the poor population, many of whom are covered by Medicaid (Aday, Andersen, and Fleming, 1980).

Use of health services by the Medicaid population has come under increasing scrutiny as States and the Federal Government seek to control the health portion of their budgets. Utilization patterns of the Medicaid population depend on several factors, ranging from the characteristics of the covered populations to the limits particular State programs place on services provided. The Medicaid population is, by definition, poor. Medicaid eligibility requires low income, although income eligibility levels vary considerably by State. However, as many observers of the program have noted, Medicaid does not cover all poor people (Rymer, Burwell, and Madigan, 1984; Joe, Meltzer, and Yu, 1985; Reinhardt, 1985). National data from 1980 indicate 49 percent of the poor and 23 percent of the near poor had Medicaid coverage during that year (Kasper, 1986). More recent data on recipients only (those who used services as opposed to all eligibles) indicate declining ratios of Medicaid recipients to the population with incomes below poverty (.64 in 1984, down from levels of .72 in 1972 and .92 in 1977, Gornick, Greenberg, Eggers et al., 1985).

One of the major factors in health care use by Medicaid eligibles, as for any population, is health status. The health status of this group as a whole may be expected to be worse than that of the rest of the population for three reasons.

- Those with Medicaid are poor and the relationship between poverty and poor health is well documented.
- Many adults receive coverage because they are disabled and receiving Federal assistance in connection with their disability under the Supplemental Security Income (SSI) program.[1]
- In States that have programs for the medically needy, people may qualify for coverage because they incur medical expenses that bring their incomes below the qualifying level.

The complex eligibility criteria for Medicaid result in a heterogeneous population with regard to many characteristics including health status.

This article describes and compares the health status of various eligibility groups within the Medicaid population to that of poor persons without Medicaid and persons who are not poor. It examines physician, prescribed medicine, and hospital use among persons in these populations who are in poor health and thus have the greatest need for care. Only the noninstitutionalized population is included in this analysis because the 1980 National Medical Care Utilization and Expenditure Survey (NMCUES), from which these data are taken, excluded the institutionalized population.

National data on health status of Medicaid eligibles by eligibility category and use of services are presented in this article for the first time. Comparisons are made, as well, between those with and those without Medicaid. Of particular interest are comparisons of the Medicaid-covered with the poor who do not qualify for Medicaid. In addition, data are presented for the Medicaid populations of four States—New York, California, Michigan, and Texas—which together represent almost one-half of the national Medicaid population.

Determinants of Medicaid eligibility

The eligibility criteria that have developed since the Medicaid program was implemented have resulted in one of the most complex of all assistance programs (Rymer, Oksman, Bailis et al., 1979). In general terms, Medicaid coverage is tied to eligibility for government cash assistance programs, specifically Aid to Families with Dependent Children (AFDC) and

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[1] The Supplemental Security Income (SSI) program for the aged, blind, and disabled was established by Congress in 1972. A federally administered cash program, SSI was designed to replace the Federal-State programs of Old Age Assistance (OAA), Aid to the Blind (AB), and Aid to the Permanently and Totally Disabled (APTD). Usually, receipt of a cash payment under SSI means automatic eligibility for Medicaid.

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Supplemental Security Income (SSI) for the aged, blind, and disabled. About three-quarters of all Medicaid recipients (users of services, not enrollees) were receiving cash payments through AFDC or SSI eligibility in 1984 (Gornick, Greenberg, Eggers et al., 1985).

Because Medicaid is jointly financed by Federal and State governments, States have considerable flexibility in designing their Medicaid programs within broad Federal guidelines. States must provide Medicaid coverage for all AFDC cash recipients but have the authority to set the need standards that determine who qualifies for AFDC. In most States, persons receiving SSI assistance are automatically eligible although there are some exceptions. There are several optional groups that may be covered by Medicaid—these are the AFDC and SSI noncash Medicaid eligibles as well as others such as children in foster homes or institutionalized persons who would be receiving cash assistance were they not institutionalized.

Aside from deciding about coverage for these optional groups, States may choose to cover medically needy individuals. A medically needy program greatly expands the number of potential eligibles, and as of 1980, 29 States and the District of Columbia had such a program (that number has remained unchanged to 1986). The decision to cover the medically needy means extending Medicaid coverage to persons with incomes below the medically needy income standard who meet categorical eligibility criteria. Also included are those who experience medical bills sufficient to reduce income below the medically needy standard. This standard is set relative to AFDC payment standards (not to exceed 133-1/3 percent of the highest amount paid to an AFDC family of the same size). As a result, in most States the medically needy level is lower than the SSI cash assistance level for which a national minimum exists. (Gornick, Greenberg, Eggers et al., 1985 presents medically needy and SSI cash assistance levels for all States.) There is no national minimum for AFDC income levels. These are set at the discretion of the States.

In addition to those groups already mentioned, some States also provide Medicaid coverage to other poor or medically needy persons regardless of whether they meet categorical eligibility criteria, but the entire expense for these State-only eligibles rests with the States. (Greater detail regarding Medicaid eligibility and program characteristics is available in Rymer, Oksman, Bailis et al., 1979).

As this brief description makes clear, eligibility for Medicaid is tied primarily to poverty or poverty in conjunction with poor health. Consequently, the composition of the Medicaid population is different from that of the U.S. population as a whole. Examining the health status of the Medicaid population and its use of health care requires that both the diverse characteristics of this population and type of eligibility be taken into consideration.

Data and methods

The data for this article are taken from the 1980 National Medical Care Utilization and Expenditure Survey (NMCUES). NMCUES was designed to provide data addressing a broad range of policy issues concerning the financing and delivery of health services in the United States. A national probability sample of 6,600 households (about 17,900 people) from the civilian noninstitutionalized population comprised the NMCUES national sample. The household survey component consisted of five interviews conducted with respondents to gain detailed information about medical care use, expenditures, sources of payment, health insurance coverage, and respondent characteristics for calendar year 1980.

In addition to the national survey, four separate surveys were conducted of the noninstitutionalized Medicaid-eligible populations of New York, California, Michigan, and Texas. A stratified sample of sufficient size was drawn from each State's Medicaid eligibility file to yield 1,000 Medicaid noninstitutionalized cases (about 3,400 people) in each State. The same data collection procedures were used for the State Medicaid Household Survey (SMHS) as for the national household survey component. Although most of the data presented in this article are from the national household sample, some data from the four-State sample are shown. NMCUES was cosponsored by the Health Care Financing Administration and the National Center for Health Statistics. The data were collected by the Research Triangle Institute and its subcontractors, the National Opinion Research Center and Systemetrics, Inc.

Measures of health status

There are a variety of ways to evaluate health status, ranging from respondent-reported assessments to clincial examinations. The measures used here are self assessments of health reported by respondents and are those developed over the years for use in surveys such as the National Health Interview Survey (conducted by the National Center for Health Statistics), the National Health Care Utilization Surveys (conducted by the Center for Health Administration Studies, University of Chicago), and the Rand Health Insurance Experiment (conducted by the Rand Corporation). Although these measures have their limitations, they identify persons in the poorest health and have been shown to relate well to levels of health service use. Because these measures have been used to describe the population as a whole for some years, it is of interest to evaluate the Medicaid population by these same measures and, in particular, to do so by type of Medicaid eligibility. A description of these measures follows:

Perceived health status—Respondents were asked how they viewed their health relative to others their age. A parent responded for children under 14 years of age. Responses were coded "excellent," "good," "fair," or "poor," and are grouped as "excellent or good" and "fair or poor" in this article, for reasons of sample size.

Activity limitations—A series of questions used routinely in the National Health Interview Survey was used to determine whether a person had a chronic condition that limited his or her activities. A chronic condition was one that lasted 3 months or longer, or was one of a number of conditions defined as chronic by the National Center for Health Statistics (NCHS) for this purpose. The activities asked about were age-related so that adults were asked about work and children about play. The NMCUES sample yielded very few children with activity limitations. Data for this measure are not presented for children. Four categories resulted from this series of questions:

- Person was not limited in any way.
- Person was not limited in his or her major activity (such as work or play), but was limited in performing other activities.
- Person was limited in the amount or kind of performance of his or her major activity.
- Person was unable to perform his major activity.

Functional limitations—There are numerous measures of functional limitations but all focus on a person's ability to perform specific activities of daily living (Katz, Ford, Moskowitz et al., 1963; Katz and Akpom, 1976; Shanas, 1977). The measures used in NMCUES were adapted from a set used in the Rand Health Insurance Experiment (Stewart, Ware, Brook et al., 1978). A series of 14 questions were asked of all persons 17 years of age or over, and an 8-item scale was constructed from these questions to reflect severity of levels of functional impairment (the questions are available in Bonham, 1983; Corder, Williams, and Conklin, 1986, indicates how the scale was created). Among those persons with some limitation (not restricted to only those caused by chronic conditions because so few nonchronic conditions were reported, Corder, Williams, and Conklin, 1985), persons were classified according to the most severe limitation they reported. The least severe category was "limitation of vigorous activities" and the most severe was "needs assistance with self-care."

Restricted activity days—Restricted activity days includes days when because of illness a person was in bed, did not go to work or school, or cut down on usual activities. In NMCUES, the recall period for restricted activity days was about 3 months rather than the 2-week period used in the National Health Interview Survey (NHIS).

Restricted activity days can be viewed as either a measure of health status or a behavioral reponse to illness (Mechanic, 1979; Wolinsky, Coe, Miller et al., 1983). Unlike the activity and functional limitation measures, however, they reflect the effects of both acute and chronic illness. For this reason, they may better reflect health status differences in some populations where chronic conditions are rare, such as children.

Medicaid eligibility and aid category

Medicaid eligibility and aid category in NMCUES were based both on reports by respondents and verification from administrative records. A file was constructed from administrative records provided by the States that were included in the national sample. All persons who reported Medicaid and were verified through records as Medicaid eligibles were assigned the appropriate aid category. Some persons were regarded as Medicaid eligibles based on reporting of cash assistance or sources of payment for medical care even though they were not found in administrative records (about one-third of all eligibles). In other words, all those reporting cash assistance could be assigned an aid category. Not every noncash eligible could be assigned an aid category, however. Thus, this article groups all noncash eligibles with State-only eligibles (who may be cash or noncash). The State-only eligibles are a very small group. Noncash eligibles include both optional coverage groups, such as low-income children under 21 years of age or families with unemployed fathers and the medically needy.

Reliability of estimates

Because the data in this article are based on a sample of the U.S. population, they are subject to sampling error. Tests of statistical significance (Z-scores) were used to determine whether differences between population estimates were significant at the .05 level. More details concerning the statistical design of NMCUES, weighting and imputation procedures, and the standard errors for the estimates presented in this article are available on request.

Findings

Factors influencing health status differences

The Medicaid population is expected to be in poorer health because of the link between poverty, poor health, and eligibility already discussed. Even without these obvious influences, however, two additional factors may contribute to observed health differences between the Medicaid and non-Medicaid populations: the age and sex distributions of these populations and differences in how health status is perceived and reported.

The eligibility criteria for Medicaid result in large differences in the age and sex composition of this population compared to persons not eligible for Medicaid. Overall, there is greater representation of both children and the elderly within the Medicaid group (Table 1). The age distribution is most skewed among male eligibles. Relatively few adult males gain Medicaid eligibility because they are seldom the AFDC adult. Most males with Medicaid are children under 18 years of age—60 percent compared with 27 percent of males without Medicaid who are not poor.

About one-fourth of males with Medicaid are between 18 and 64 years of age. In contrast, 65 percent of the male population without Medicaid who are not poor fall within this age range. Medicaid eligibility for males 18-64 years of age derives mainly from SSI disability or coverage not associated with cash assistance, such as medically needy status. The remaining 12.8 percent of males with Medicaid are age 65 or over compared with 8.0 percent in the same age group without Medicaid and who are not poor. A higher percentage of males with Medicaid were 75 years of age or over as well.

Because of the presence of AFDC mothers primarily in the group 18-44 years of age, the female Medicaid population is more evenly distributed by age than is the male Medicaid population. As a whole, the Medicaid population between 18-64 years of age is predominantly female for the same reason—most AFDC adults are women. Of the female Medicaid population, 37 percent are children under 18 years of age, compared with 26 percent who are not poor. Females 18-64 years of age represent 44.3 percent of all females with Medicaid compared with 64.7 percent of females who are not poor and without Medicaid.

Among females with Medicaid, 14.1 percent are 65 years of age or over compared with 9.3 percent of those without Medicaid who are not poor. The percentage of females 75 years of age or over was not significantly different between the Medicaid population and the population that is not poor (3 to 4 percent).

The poor without Medicaid, similar to the Medicaid population, are overrepresented among the youngest and oldest age groups. Compared with the 11.6 million children under 18 years of age with Medicaid coverage, about 9.7 million poor children in this age range are not covered by Medicaid.

There are fewer working-age adults (18-64 years) in the poor population without Medicaid coverage and a higher percentage of elderly persons than in the population that is not poor. The difference is most striking among females.

Of poor females without Medicaid coverage, 21 percent are age 65 or over, compared with 9.3 percent of females who are not poor. Of poor females without Medicaid, 10 percent are age 75 or over, compared with 2.8 percent who are not poor, and 4.3 percent of those with Medicaid coverage.

To control for differences in age distributions among the populations of interest, the data that follow are presented within age groups. Persons 65 years of age or over are grouped together for reasons of sample size, even though Table 1 indicates differences among these populations in the proportion of persons 75 years of age or over. Because increased age is associated with a greater likelihood of poor

Table 1

Percent distribution of persons, by sex, Medicaid eligibility, poverty level, aid category, and age: United States, 1980

Item	Population in thousands	Age: Under 6 years	6-17 years	18-34 years	35-44 years	45-64 year	65-74 years	75 years or over
		Percent distribution						
Male								
Without Medicaid:								
Poor[1]	12,642	[2]15.6	21.8	27.2	[2]9.1	[2]14.5	7.2	[2]4.6
Not poor	84,769	7.4	19.8	30.7	12.9	21.3	5.6	2.4
With Medicaid	10,128	[2,3]24.6	[2,3]34.7	[2,3]16.3	([4])	[2,3]9.1	[2]8.5	[2]4.3
AFDC, cash	5,646	[2,3]36.3	[2,3]51.0	[2,3]9.6	([4])	([4])	—	—
SSI blind or disabled, cash	966	([4])	([4])	31.5	([4])	[2,3]35.7	([4])	([4])
SSI aged, cash	665	—	—	—	—	—	[2,3]59.8	[2,3]38.9
Other[5]	2,851	[2]13.3	18.7	28.1	([4])	16.1	[2,3]15.2	([4])
Female								
Without Medicaid:								
Poor[1]	16,135	[2]9.6	20.2	[2]25.1	[2]7.9	[2]16.2	[2]11.0	[2]10.0
Not poor	84,244	7.5	18.5	29.7	13.0	22.0	6.5	2.8
With Medicaid	14,959	[2,3]14.7	[2]22.5	[2]27.2	[2]6.5	[2,3]10.6	[2]9.8	[3]4.3
AFDC, cash	8,408	[2,3]20.5	[2,3]35.1	[3]33.0	[2]7.8	[2,3]3.3	—	—
SSI blind or disabled, cash	1,324	([4])	([4])	25.0	([4])	[2,3]46.5	([4])	—
SSI aged, cash	1,633	—	—	—	—	—	[2,3]45.0	[2,3]53.5
Other[5]	3,583	11.0	[2,3]9.5	26.4	[2]7.2	19.1	[2]15.7	[2]11.2

[1] Less than or equal to 150 percent of the poverty level (income adjusted for family size).

[2] Significantly different at the .05 level from the population without Medicaid who are not poor.

[3] Significantly different at the .05 level from the population without Medicaid who are poor.

[4] Fewer than 20 cases or relative standard error greater than or equal to 50 percent.

[5] All noncash eligibles and all State-only eligibles, both cash and noncash.

NOTES: AFDC is Aid to Families with Dependent Children; SSI is Supplemental Security Income.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the household survey component, National Medical Care Utilization and Expenditure Survey, 1980.

health and use of health services, age differences within the elderly group may remain a factor in health status and utilization differences detailed later in this article.

As already noted, females are overrepresented in the adult Medicaid population. For example, they constitute 86 percent of the AFDC population from age 18 to 44. It is now well documented that females have higher levels of morbidity and health services use than do men (Verbrugge, 1985). Females are a smaller proportion of the population without Medicaid who are not poor. This may account for some of the health status and utilization differences between this group and the population with Medicaid, particularly among those age 18-44 years. The sample size was not sufficient to show data by both age and sex.

Table 2 shows the relationship between reporting excellent or good and fair or poor health and presence of activity or functional limitations. In the age groups 18-44 and 45-64, those with Medicaid who report excellent or good health are more likely to have a functional or activity limitation than those without Medicaid. For example, of all those with Medicaid age 45-64 and in excellent or good health, 33.1 percent report a functional or activity limitation compared with only 19.4 percent of those without Medicaid. Among those reporting fair or poor health, those with Medicaid were more likely to report both an activity and functional limitation at all ages.

Several relationships are suggested by Table 2. First, persons with Medicaid who report fair or poor health are much more likely to also report functional and activity limitations, and persons without Medicaid report fair or poor health in the absence of such limitations. This may indicate poorer health status among those with Medicaid even within the group of all persons reporting fair or poor health. Second, among persons reporting excellent or good health, a higher percentage of persons with Medicaid are likely to have a functional or activity limitation than persons without Medicaid. Persons with Medicaid who report excellent or good health in the presence of limitation of function or activity may have lower expectations of health. The elderly, age 65 or over, also have a greater tendency to report excellent or good health in the presence of activity limitations (Kovar and Wilson, 1976). These data show that among the elderly without Medicaid who report excellent or good health, about one-half report a functional or activity limitation as well, compared with less than one-fourth of the age group, 45-64.

Comparisons of health status

Presented in Tables 3, 4, and 5 are measures of health status for the Medicaid population by aid category and for persons without Medicaid coverage, both poor and not poor. Most children and young persons under age 18 are in good health (Table 3). However, at least twice the percentage of both young (under 6 years) and older (age 6-17) children with Medicaid are in fair or poor health, compared with children without Medicaid who are not poor.

No significant differences were found between those with Medicaid and others in the mean number of restricted-activity days among children age 17 or younger. However, for children under 6 years in fair or poor health, the average number of restricted-activity days is much higher for Medicaid children (26.4 days) than for children who are not poor (16.2 days). For children under age 6 who had 15 or more restricted-activity days, children with Medicaid again have a higher average number of restricted days. Among children age 6-17 in fair or poor health, those with Medicaid have fewer restricted-activity days than children without Medicaid who are not poor. For older children with 15 or more restricted-activity days,

Table 2

Relationship between perceived health status and presence of functional or activity limitations for persons, by age and Medicaid eligibility: United States, 1980

Item	Excellent or good health				Fair or poor health			
	Population in thousands	No functional or activity limitations	Functional or activity limitations, but not both	Both functional and activity limitations	Population in thousands	No functional or activity limitations	Functional or activity limitations, but not both	Both functional and activity limitations
		Percent distribution				Percent distribution		
18-44 years								
Without Medicaid	76,966	90.7	8.9	.4	5,787	57.6	32.4	10.0
With Medicaid	4,999	[1]81.3	[1]13.8	(2)	1,961	[1]36.1	[1]43.3	[1]20.6
45-64 years								
Without Medicaid	32,843	78.3	19.4	2.3	8,230	27.5	41.7	30.9
With Medicaid	798	[1]46.5	[1]33.1	(2)	1,708	(2)	37.4	[1]55.1
65 years or over								
Without Medicaid	12,823	49.2	32.0	18.8	6,592	11.9	38.0	50.1
With Medicaid	1,922	[1]25.9	38.5	[1]35.6	2,132	(2)	35.6	[1]59.0

[1] Significantly different at the .05 level from the population without Medicaid.

[2] Fewer than 20 cases or relative standard error greater than or equal to 50 percent.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the household survey component, National Medical Care Utilization and Expenditure Survey, 1980.

Table 3

Measures of health status for persons under 18 years, by Medicaid eligibility, poverty level, and aid category: United States, 1980

Item	Population in thousands	Percent in fair or poor health	Restricted-activity days						
			Mean for—			Percent distribution			
			All persons	Persons in fair or poor health	Persons with 15 or more days	0	1 to 7	8 to 14	15 or more
Under 6 years									
Without Medicaid:									
Poor[1]	3,517	(2)	7.1	(2)	29.0	28.7	39.5	18.3	13.6
Not poor	12,596	3.0	7.7	16.2	27.4	24.4	43.8	16.9	14.8
With Medicaid	4,692	[3]6.7	8.2	[3]26.4	[3]34.6	[3]33.1	[3]37.0	15.4	14.6
AFDC, cash	3,771	(2)	7.5	(2)	32.3	[3]35.9	[3]34.8	15.9	13.4
All other	922	(2)	[4]11.3	(2)	(2)	21.3	46.0	(2)	(2)
6-17 years									
Without Medicaid:									
Poor[1]	6,017	4.4	7.1	[4]9.6	36.1	31.6	38.3	17.6	12.5
Not poor	32,419	2.6	7.4	26.2	32.2	28.4	43.7	14.4	13.5
With Medicaid	6,874	[3]7.8	6.6	[3]10.2	33.1	[3,5]39.2	36.3	[5]12.5	12.0
AFDC, cash	5,833	[3]7.8	6.5	[3]10.6	33.5	[3,5]39.8	37.0	[3,5]11.4	11.9
All other	1,042	(2)	7.0	(2)	(2)	36.0	32.7	(2)	(2)

[1] Less than or equal to 150 percent of the poverty level (income adjusted for family size).

[2] Fewer than 20 cases or relative standard error greater than or equal to 50 percent.

[3] Significantly different at the .05 level from the population without Medicaid who are not poor.

[4] Relative standard error is greater than 30 percent but less than 50 percent.

[5] Significantly different at the .05 level from the population without Medicaid who are poor.

NOTES: AFDC is Aid to Families with Dependent Children.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the household survey component, National Medical Care Utilization and Expenditure Survey, 1980.

there were no differences between those with and without Medicaid.

The distribution of restricted-activity days indicates children with Medicaid are more likely to have no restricted-activity days than are children who are not poor. A similar pattern was observed between children with and without Medicaid for the distribution of bed-disability days (data not shown).

These data on restricted-activity days provide conflicting messages about differences in health status between children with and without Medicaid. Although restricted-activity days may serve as a health status measure, there are difficulties of interpretation, particularly for children. One problem is that parents were asked to report numbers of restricted-activity days over a 3-month period prior to each interview. Differential ability to recall such data accurately may account in part for the pattern of number of restricted-activity days just discussed. Furthermore, there is no way of knowing whether restricted-activity days may be underreported for children with Medicaid or overreported for those without Medicaid. A second problem lies in the extent to which restricted-activity days are a response to illness rather than a direct reflection of differing levels of morbidity. Use of restricted-activity days as a health measure for children is further complicated because parents play a role in deciding when normal activities should be restricted because of illness. In short, these data on restricted-activity days probably reflect variations in recall of events or response to illness by socioeconomic status as well as differences in health status.

Among adults, the Medicaid population is in generally poorer health than both the poor without Medicaid and the population that is not poor (Table 4). Among those age 18-44 and 45-64, both the total Medicaid population and each aid category are more likely to be in fair or poor health, to have a limitation of activity, and to have a functional limitation than either those who are not poor or the poor without Medicaid. Mean restricted-activity days were highest for the Medicaid population as well.

AFDC cash eligibles age 18-44 are four times more likely to report being in fair or poor health than those without Medicaid who are not poor (27.1 percent compared with 6.0 percent). Not surprisingly, in the SSI disabled population, 46.2 percent of the age group 18-44 and 73.8 percent of those 45-64 are in fair or poor health. Presence of activity and functional limitations in the SSI disabled population is quite high as well, about 60 percent in both age groups reported an activity limitation. This compares with about 3 percent of those age 18-44 and 8 percent of those age 45-64 who are not poor.

Among the elderly (age 65 or over), about one-half of both the SSI aged and other eligibles are in fair or poor health compared with about one-third of the elderly who are not poor. Among those age 75 or over, 51.0 percent of those with Medicaid are in fair or poor health compared with 33.1 percent of those who are not poor (data not shown). Of the Medicaid elderly, 70-80 percent reported a functional limitation compared with one-half of the elderly who are not poor.

Table 4

Measures of health status for adults 18 years or over, by Medicaid eligibility, poverty level, and aid category: United States, 1980

Item	Population in thousands	Percent with—			Restricted-activity days			
		Fair or poor health	Any limitation of activity due to chronic condition	Any functional limitation	Mean	Percent with— 0	15 or more	30 or more
18-44 years								
Without Medicaid:								
Poor[1]	9,911	[2]14.0	[2]4.5	11.2	12	34.7	16.9	9.9
Not poor	72,842	6.0	2.7	9.7	10	34.5	17.0	8.6
With Medicaid	6,960	[2,3]28.2	[2,3]17.7	[2,3]23.1	[2,3]20	[2,3]25.7	[2,3]29.0	[2,3]18.5
AFDC, cash	4,046	[2,3]27.1	[2,3]9.6	[2,3]19.9	[2]15	[2,3]26.4	[2,3]25.0	[2,3]15.1
SSI blind or disabled, cash	796	[2,3]46.2	[2,3]60.3	[2,3]41.4	[2,3]39	([4])	[2,3]35.5	([4])
Other[5]	2,105	[2,3]23.6	[2,3]17.2	[2,3]22.4	[2,3]24	[2,3]22.5	[2,3]34.3	[2,3]23.5
45-64 years								
Without Medicaid:								
Poor[1]	4,445	[2]43.6	[2]23.9	[2]50.8	[2]29	[2]34.8	[2]33.9	[2]24.3
Not poor	36,627	17.2	8.2	27.6	16	40.5	23.2	14.7
With Medicaid	2,506	[2,3]68.2	[2,3]50.5	[2,3]73.5	[2,3]45	[2,3]26.8	[2,3]44.6	[2,3]37.0
SSI blind or disabled, cash	960	[2,3]73.8	[2,3]62.2	[2,3]79.8	[2]50	31.5	[2]42.6	[2]35.2
Other[5]	1,145	[2,3]66.7	[2,3]46.3	[2,3]72.4	[2,3]46	([4])	[2,3]50.1	[2,3]42.1
65 years or over								
Without Medicaid:								
Poor[1]	4,887	[2]42.5	38.9	[2]63.3	29	39.4	35.1	26.1
Not poor	14,528	31.1	37.0	52.6	25	40.9	30.9	22.7
With Medicaid	4,054	[2,3]52.6	[2,3]54.7	[2,3]78.1	[2,3]57	[2,3]23.8	[2,3]54.6	[2,3]45.9
SSI aged, cash	2,265	[2]52.3	[2,3]54.3	[2,3]80.2	[2,3]53	[2,3]22.5	[2,3]53.4	[2,3]43.9
Other[5]	1,545	[2]52.6	[2,3]53.5	[2,3]73.3	[2,3]67	[2,3]26.9	[2,3]56.2	[2,3]50.0

[1] Less than or equal to 150 percent of the poverty level (income adjusted for family size).
[2] Significantly different at the .05 level from the population without Medicaid who are not poor.
[3] Significantly different at the .05 level from the population without Medicaid who are poor.
[4] Fewer than 20 cases or relative standard error greater than or equal to 50 percent.
[5] All noncash eligibles and all State-only eligibles, both cash and noncash.

NOTES: AFDC is Aid to Families with Dependent Children; SSI is Supplemental Security Income.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the household survey component, National Medical Care Utilization and Expenditure Survey, 1980.

Table 5

Age and Medicaid eligibility, by severity of functional limitation: United States, 1980

	Age					
	18-64 years			65 years or over		
		Without Medicaid			Without Medicaid	
Item	With Medicaid	Poor[1]	Not poor	With Medicaid	Poor[1]	Not poor
Population in thousands	9,466	14,356	109,470	4,054	4,887	14,528
Most severe limitation						
			Percent of persons			
None	[2,3]63.6	[2]76.5	84.3	[2,3]21.9	[2]36.7	47.4
Vigorous activities	5.5	6.8	5.3	10.1	10.4	11.2
Doing work	[2,3]10.0	4.5	3.5	7.1	6.5	5.7
Walking several blocks	[2,3]6.6	3.5	2.9	10.2	15.2	11.1
Walking one block	[2]4.9	[2]5.2	2.6	11.3	11.7	10.4
Ability to get around	[2,3]5.6	[2]2.4	1.0	[2,3]17.6	8.8	7.5
Needs assistance in walking	(4)	(4)	(4)	[2,3]11.3	[2]6.5	3.0
Needs assistance in self care	(4)	(4)	(4)	[2]10.5	(4)	3.7

[1] Less than or equal to 150 percent of the poverty level (income adjusted for family size).

[2] Significantly different at the .05 level from the population without Medicaid who are not poor.

[3] Significantly different at the .05 level from the population without Medicaid who are poor.

[4] Fewer than 20 cases or relative standard error greater than or equal to 50 percent.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the household survey component, National Medical Care Utilization and Expenditure Survey, 1980.

Table 6

Use of health services for persons under 18 years in fair or poor health, by Medicaid eligibility, poverty level, and aid category: United States, 1980

	Persons in fair or poor health					
		Percent with at least one—			Mean	
Item	Population in thousands	Physician visit	Prescribed drug	Hospital stay	Physician visits	Prescribed drugs
Under 6 years						
Without Medicaid:						
Poor[1]	(2)	(2)	(2)	(2)	(2)	(2)
Not poor	379	95.8	85.9	(2)	8.1	7.4
With Medicaid	316	90.3	83.2	(2)	5.5	4.8
AFDC, cash	(2)	(2)	(2)	(2)	(2)	(2)
All other	(2)	(2)	(2)	(2)	(2)	(2)
6–17 years						
Without Medicaid:						
Poor[1]	(2)	(2)	(2)	—	(2)	(2)
Not poor	835	91.9	79.6	(2)	8.4	6.3
With Medicaid	536	85.0	72.1	(2)	6.0	[3]3.8
AFDC, cash	454	82.3	72.3	(2)	5.8	[3]3.8
All other	(2)	(2)	(2)	(2)	(2)	(2)

[1] Less than or equal to 150 percent of the poverty level (income adjusted for family size).

[2] Fewer than 20 cases or relative standard error greater than or equal to 50 percent.

[3] Significantly different at the .05 level from the population without Medicaid who are not poor.

NOTE: AFDC is Aid to Families with Dependent Children.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the household survey component, National Medical Care Utilization and Expenditure Survey, 1980.

In almost every instance, the poor without Medicaid are in worse health than those who are not poor. They are more likely within each age group to report being in fair or poor health than persons who are not poor. For example, more than 40 percent of poor persons without Medicaid are in fair or poor health in the age groups 45-64 and 65 or over. A higher percent of the poor without Medicaid who are under age 65 report an activity limitation. In addition, one-half of those age 45-64 report a functional limitation compared with about 28 percent of persons who are not poor in that age group. Finally, more of the elderly poor without Medicaid report a functional limitation than the elderly who are not poor. Although the Medicaid population is in the worst health, those who are poor and without Medicaid are in much worse health than those who are not poor.

Types of functional limitation for persons with and without Medicaid by age group are shown in Table 5. Persons are classified by the most severe limitation

Table 7

Use of health services for persons under 18 years with 15 or more restricted-activity days, by Medicaid eligibility, poverty level, and aid category: United States, 1980

	Persons with 15 or more restricted-activity days					
		Percent with at least one—			Mean	
Item	Population in thousands	Physician visit	Prescribed drug	Hospital stay	Physician visits	Prescribed drugs
Under 6 years						
Without Medicaid:						
Poor[1]	477	96.5	91.0	(2)	6.7	4.8
Not poor	1,867	99.1	92.6	22.3	7.4	5.5
With Medicaid	685	94.9	88.1	(2)	7.3	5.2
AFDC, cash	505	95.5	86.3	(2)	7.3	4.9
All other	(2)	(2)	(2)	(2)	(2)	(2)
6-17 years						
Without Medicaid:						
Poor[1]	754	93.0	68.5	(1)	5.4	2.8
Not poor	4,386	94.1	78.2	20.7	6.3	3.9
With Medicaid	828	[3]98.7	73.4	30.8	6.2	3.2
AFDC, cash	693	100.0	74.1	35.0	6.6	3.4
All other	(2)	(2)	(2)	(2)	(2)	(2)

[1] Less than or equal to 150 percent of the poverty level (income adjusted for family size).

[2] Fewer than 20 cases or relative standard error greater than or equal to 50 percent.

[3] Significantly different at the .05 level from the population without Medicaid who are not poor.

NOTE: AFDC is Aid to Families with Dependent Children.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the household survey component, National Medical Care Utilization and Expenditure Survey, 1980.

they reported. Among persons age 18-64 with Medicaid, 10.0 percent reported they were unable to work compared with 3.5 percent of those who are not poor (the SSI disabled are in this age group). Both the Medicaid population and the poor without Medicaid are more likely to have severe limitations than those who are not poor. Of those with Medicaid, 5.6 percent are limited in their ability to get around; 2.4 percent of the poor without Medicaid and 1.0 percent of those who are not poor are so limited.

Among the elderly (age 65 or over), functional limitations are most severe in the Medicaid population. About 40 percent of the elderly with Medicaid are limited in their ability to get around, need assistance in walking, or need assistance in self care. In contrast, only 14.2 percent of the elderly who are not poor have one of these three severe types of limitations.

Health status and services use

The health status of the Medicaid population is of interest because of the implications for health care use. Health status has been shown to be one of the best predictors of use of health services (Andersen, 1968; Andersen and Newman, 1973). The previous section of this article documents the poorer health status of the Medicaid population as a whole and by aid category in comparison to those without Medicaid, particularly those who are not poor.

The Medicaid program was intended to provide access to mainstream medical care for some of the most disadvantaged population groups. This section examines whether for those at greatest risk—persons with poor health status—Medicaid coverage results in levels of health service use comparable to similar persons without such coverage. Use of physicians' services, prescribed drugs,[2] and inpatient hospital care are shown by age group and aid category.

Coverage of physician and hospital services is required of all State Medicaid programs, but coverage of prescribed drugs is optional and need not be extended to the medically needy program. Nevertheless, in 1980, only two States provided no coverage for prescribed drugs and only one State with a medically needy program did not extend drug coverage to this group. Almost all States did impose some type of limitation on drug services, either through restricted formulary lists or limits on number of prescriptions or refills per month.

Among children in fair or poor health (Table 6) or those with 15 or more restricted-activity days (Table 7) there are almost no differences in use of health services between those with Medicaid coverage and those without. The exception is the lower average number of prescribed drugs for older (age 6-17 years) Medicaid children compared with those who are not poor (3.8 for the former compared with 6.3 for the latter, Table 6). Otherwise, among children with fair or poor health, those with Medicaid are as likely to see a physician or obtain a prescribed drug as children who are not poor. They had similar numbers of physician visits as well.

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[2] Measured as separate purchases of drugs. No distinction is made between purchases of different medicines and refills of the same medication.

Among adults under age 65 in fair or poor health (Table 8), those with Medicaid are as likely, or more likely in some instances, to see a physician or use at least one prescribed drug as adults without Medicaid who are not poor. Poor persons without Medicaid, however, are significantly less likely to obtain prescribed drugs than their counterparts who are not poor. In the age group 45-64, they are less likely to see a physician as well. In the elderly population age 65 or over, most of whom have Medicare coverage, those with Medicaid and in fair or poor health are both more likely to see a physician and more likely to use a prescribed drug than those without Medicaid and in fair or poor health.

Higher mean numbers of physician visits and prescribed drugs occurred for persons with Medicaid in both the age 45-64 and age 65 or over populations in comparison to the poor without Medicaid. Persons with eligibility other than SSI cash assistance had the highest levels of use, which may indicate the poorer health of the noncash eligibles among whom are the medically needy.

Use of services for adults with functional limitations is presented in Table 9. Almost no differences exist in the likelihood of seeing a physician or using a prescribed drug. However, mean numbers of physician visits and prescribed drugs are consistently higher for those with Medicaid than for the poor without Medicaid coverage, 9.7 versus 5.7 mean physician visits among those age 18-44 and 9.8 versus 6.7 among those age 65 or over. As before, mean numbers of physician visits, prescribed drugs, and restricted-activity days are much higher for other eligibles (noncash and State-only Medicaid eligibles). Average number of prescribed drugs purchased is especially high among those age 45-64 with Medicaid and having a functional limitation, 20.3 per person for the SSI disabled and 23.7 for other eligibles, compared with about 13 for persons without Medicaid.

The use of hospital services for persons in fair or poor health and persons with a functional limitation is presented in Table 10. Among those age 18-44, there are no differences in likelihood of an admission or average number of days between those with and without Medicaid. For those with a functional limitation, there was a greater likelihood of hospitalization among other eligibles (noncash and State-only) in the age 45-64 group. As already noted, physician visits and prescribed medicine purchases were higher for this eligibility group as well.

The elderly (age 65 or over) in the other (noncash and State-only) category have both a greater likelihood of hospitalization and higher average

Table 8

Use of physician services and prescribed drugs for adults 18 years or over in fair or poor health, by Medicaid eligibility, poverty level, and aid category: United States, 1980

Item	Population in thousands	Persons in fair or poor health				
		Percent with at least one—		Mean		
		Physician visit	Prescribed drug	Physician visits	Prescribed drugs	Restricted activity days
18–44 years						
Without Medicaid:						
Poor[1]	1,387	77.4	[2]67.4	8.6	[2]6.0	28
Not poor	4,400	85.2	86.6	8.4	9.0	33
With Medicaid	1,961	[3]90.5	[3]84.5	9.5	[3]10.1	42
AFDC, cash	1,097	[2,3]93.4	[3]86.6	8.4	8.3	30
Other[4]	497	89.7	83.8	11.2	10.7	51
45–64 years						
Without Medicaid:						
Poor[1]	1,936	[2]77.8	[2]73.3	6.7	12.8	46
Not poor	6,294	86.4	82.9	7.7	14.8	39
With Medicaid	1,708	86.1	[3]84.2	[2,3]10.8	[2,3]21.9	[2]58
SSI blind or disabled, cash	708	75.4	78.9	9.7	[3]20.8	64
Other[4]	763	[2,3]96.6	[2,3]93.4	[2,3]12.9	[2,3]26.1	[2]59
65 years or over						
Without Medicaid:						
Poor[1]	2,077	84.3	82.6	7.5	14.8	80
Not poor	4,515	88.3	87.0	9.0	17.7	74
With Medicaid	2,132	[2,3]94.7	[2,3]93.8	[3]11.0	[3]20.9	54
SSI aged, cash	1,184	[3]92.6	[3]91.4	8.9	15.9	72
Other[4]	813	[2,3]96.8	[2,3]96.3	[2,3]13.5	[2,3]27.3	90

[1] Less than or equal to 150 percent of the poverty level (income adjusted for family size).

[2] Significantly different at the .05 level from the population without Medicaid who are not poor.

[3] Significantly different at the .05 level from the population without Medicaid who are poor.

[4] All noncash eligibles and all State-only eligibles, both cash and noncash.

NOTES: AFDC is Aid to Families with Dependent Children; SSI is Supplemental Security Income.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the household survey component, National Medical Care Utilization and Expenditure Survey, 1980.

Table 9

Use of physician services and prescribed drugs for adults 18 years or over with a functional limitation, by Medicaid eligibility, poverty level, and aid category: United States, 1980

Item	Population in thousands	Persons with a functional limitation				
		Percent with at least one—		Mean		
		Physician visit	Prescribed drug	Physician visits	Prescribed drugs	Restricted activity days
18–44 years						
Without Medicaid:						
Poor[1]	1,112	84.0	79.6	[2]5.7	5.8	37
Not poor	7,061	87.6	81.1	7.8	7.2	33
With Medicaid	1,604	85.8	83.3	[3]9.7	[2,3]11.2	45
AFDC, cash	803	92.5	[2]90.1	[3]8.9	[2,3]10.4	36
Other[4]	471	91.6	85.2	[2,3]12.2	[3]11.2	[2]60
45–64 years						
Without Medicaid:						
Poor[1]	2,259	[2]80.0	76.9	7.1	12.6	[2]48
Not poor	10,111	89.0	83.9	7.8	13.3	36
With Medicaid	1,841	84.0	80.9	[2,3]10.9	[2,3]20.7	[2]57
SSI blind or disabled, cash	766	77.9	76.2	9.6	[2,3]20.3	61
Other[4]	829	90.4	85.6	[2,3]12.5	[2,3]23.7	[2]58
65 years or over						
Without Medicaid:						
Poor[1]	3,095	85.9	85.1	[2]6.7	14.4	39
Not poor	7,646	88.1	87.3	8.5	16.1	37
With Medicaid	3,167	91.2	90.4	[3]9.8	[3]18.0	[2,3]67
SSI aged, cash	1,817	91.3	90.3	8.2	14.3	[2]59
Other[4]	1,132	89.3	88.7	[2,3]11.6	[2,3]22.6	[2,3]86

[1] Less than or equal to 150 percent of the poverty level (income adjusted for family size).

[2] Significantly different at the .05 level from the population without Medicaid who are not poor.

[3] Significantly different at the .05 level from the population without Medicaid who are poor.

[4] All noncash eligibles and all State-only eligibles, both cash and noncash.

NOTES: AFDC is Aid to Families with Dependent Children; SSI is Supplemental Security Income.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the household survey component, National Medical Care Utilization and Expenditure Survey, 1980.

numbers of hospital days than the elderly without Medicaid, both the poor and those who are not poor. Because older individuals within the elderly population are at greater risk for hospitalization, one explanation might be that noncash and State-only eligibles are older. However, this is not the case. Persons age 75 or over represent about 29 percent of elderly noncash and State-only eligibles. They represent about 50 percent of SSI aged cash recipients whose use of hospital services is generally not different from that of the population without Medicaid.

Utilization, including hospital use, is shown only for those reporting poor health. It is possible that although fewer persons in the noncash and State-only group are age 75 or over, they make up a higher percentage of those in poor health. However, among the Medicaid elderly who report fair or poor health, about 49 percent of cash recipients are age 75 or over, compared with 33 percent of other eligibles (data not shown). Thus, the higher rates of physician, prescribed drug, and hospital use among elderly noncash eligibles appears to be a result of the poorer health of this group, rather than the greater age of this population. Among these noncash and State-only eligibles are the medically needy, and these data confirm the greater demand for health services by these individuals, even within a population all of whom report poor health.

Differences in four-State survey

In addition to the national survey, data were collected in State Medicaid Household Surveys conducted in New York, California, Michigan, and Texas. The States were chosen for their large Medicaid programs, their locations in different regions, and their Medicaid programmatic differences ranging from generous to restrictive in terms of benefits and eligibility.

The four States varied greatly in the composition of their Medicaid programs. Eligibility requirements were different, so that individuals in identical financial circumstances may have qualified for Medicaid in one State but not another. Texas, for example, has much lower AFDC payment levels than the other three States and no medically needy or State-only program. A brief description of program differences by State is presented in Table 11.

Some differences in likelihood of reporting fair or poor health are shown in Table 12. AFDC cash recipients under age 18 in California, Michigan, and New York are more likely to be in fair or poor health than the national Medicaid population for this age

Table 10

Use of hospital services for adults 18 years or over in fair or poor health or with a functional limitation, by Medicaid eligibility, poverty level, and aid category: United States, 1980

Item	Persons in fair or poor health			Persons with a functional limitation		
	Population in thousands	Percent with at least one admission	Average hospital days per person	Population in thousands	Percent with at least one admission	Average hospital days per person
18-44 years						
Without Medicaid:						
Poor[1]	1,387	21.4	[2]1.9	1,112	26.7	2.9
Not poor	4,400	26.2	3.0	7,061	22.6	3.0
With Medicaid	1,961	30.1	4.1	1,604	30.3	3.6
AFDC, cash	1,097	28.3	[2]3.1	803	31.2	2.2
Other[3]	497	(4)	[2]6.1	471	(4)	[2]5.6
45-64 years						
Without Medicaid:						
Poor[1]	1,936	[5]15.5	2.5	2,259	17.8	2.7
Not poor	6,294	25.8	3.6	10,111	22.5	3.1
With Medicaid	1,708	[6]30.9	[5,6]6.3	1,841	[6]30.8	[6]5.0
SSI blind or disabled, cash	708	(4)	[2]5.1	766	(4)	[2]4.7
Other[3]	763	[6]34.8	6.4	829	[5,6]34.2	4.8
65 years or over						
Without Medicaid:						
Poor[1]	2,077	[5]18.2	[5]2.8	3,095	22.3	3.0
Not poor	4,515	29.8	5.5	7,646	27.1	4.0
With Medicaid	2,132	[5]36.8	[5,6]9.1	3,167	[6]34.3	[5,6]8.1
SSI aged, cash	1,184	29.9	5.5	1,817	29.0	5.9
Other[3]	813	[5,6]44.3	[5,6]14.0	1,132	[5,6]42.0	[5,6]11.8

[1] Less than or equal to 150 percent of the poverty level (income adjusted for family size).

[2] Relative standard error is greater than 30 percent but less than 50 percent.

[3] All noncash eligibles and all State-only eligibles, both cash and noncash.

[4] Fewer than 20 cases or relative standard error greater than or equal to 50 percent.

[5] Significantly different at the .05 level from the population without Medicaid who are not poor.

[6] Significantly different at the .05 level from the population without Medicaid who are poor.

NOTES: AFDC is Aid to Families with Dependent Children; SSI is Supplemental Security Income.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the household survey component, National Medical Care Utilization and Expenditure Survey, 1980.

group. In each aid category, the Texas group is more likely to be in fair or poor health than the national average, with the exception of the under age 18 AFDC group.

With regard to physician use (Table 13), the four States are similar to the national population in each category with the exception of the SSI blind or disabled cash recipients in California, Michigan, and New York are more likely to see a physician. Mean physician visits are higher in California and New York for this group as well. Mean numbers of prescribed drugs are significantly lower for adults with Medicaid in each aid category for the four States compared with the national population. Information in Table 11 does not suggest that coverage of drug services was particularly restrictive in these States.

In Table 14 few differences are indicated in hospital use by the four State populations compared with the national Medicaid population. The noncash and State-only eligibles in New York and California are less likely to be hospitalized and average fewer hospital days than the national population.

Conclusions

By several measures of health status, the Medicaid population is in worse health than persons without Medicaid coverage. This relationship holds for children and adult AFDC recipients as well as the SSI and noncash eligible populations. At the same time, poor persons without Medicaid coverage, although often in better health than the Medicaid-covered, are in worse health than those who are not poor.

Among Medicaid children under 6 years of age, the percentage in fair or poor health is twice that of children who are not poor. Among the age group 6-17 with Medicaid, the percentage in fair or poor health is three times that of children who are not poor. Numbers of restricted-activity days among those in fair or poor health are much higher for young Medicaid children compared with similar children who are not poor, but the reverse was true for older children. Among children in poor health by the measures used here, Medicaid coverage provided levels of physician and prescribed drug use comparable to that for children who are not poor.

Table 11
Characteristics of four State Medicaid programs: 1980

Selected characteristic	California	New York	Michigan	Texas
	State Medicaid programs			
Medicaid population in thousands	3,374	2,364	898	682
Categorically needy program: Additional groups covered	6 additional groups, mostly AFDC related	8 additional groups, AFDC and SSI related	3 additional groups, AFDC and SSI related	3 additional groups, mostly institutionalized
AFDC monthly need level	$511	$476	$470	$187
AFDC monthly payment level (family of 4)	$487	$476	$470	$140
Medically needy program	yes	yes	yes	no
Medically needy monthly protected income level (family of 4)	$650	$458	$498	—
State-only program	yes	yes	yes	no
Prescribed drug restrictions	100 days supply, restricted formulary list	Restricted formulary list	Prescribed by licensed practitioner	Restricted under drug program, 5 refills in 6 months

NOTES: AFDC is Aid to Families with Dependent Children; SSI is Supplemental Security Income.

SOURCES: Health Care Financing Administration and National Center for Health Statistics. Data from the National Medical Care Utilization and Expenditure Survey, 1980; Sawyer, D., Ruther, M., Pagan-Berlucchi, A., Muse, D. N.: *The Medicare and Medicaid Data Book, 1981.* HCFA Pub. No. 03128. Office of Research, Demonstrations, and Statistics, Health Care Financing Administration. Washington. U.S. Government Printing Office, Apr., 1982.

The measures of health status for children that are available from NMCUES are limited. Perceived health status and restricted-activity days are used in this article. Shortcomings of restricted-activity days as a health status measure for children were previously discussed. Studies of specific health problems such as lead poisoning, otitis media, and psychosocial and psychosomatic problems have consistently shown greater severity of illness and higher prevalence of these types of conditions among poor children (Egbuonu and Starfield, 1982). Additional measures of children's health status need to be included in future surveys to contribute to a better understanding of the relationship between poverty and poor health for children.

Medicaid adults in all aid categories exhibit poorer health status when compared with other adults in the same age group. These differences are not limited to disabled adult eligibles but extend to AFDC recipients and the SSI aged. Among AFDC cash recipients age 18-44, for example, the percentage with activity limitations is three times that for persons in the same age group without Medicaid coverage who are not poor. Higher levels of activity and functional limitations are observed when compared with persons without Medicaid coverage. Most striking, perhaps, is the much greater severity of functional limitations among Medicaid eligibles. For the elderly, one-half of those reporting a functional limitation said they were limited in their ability to get around or needed assistance in walking or with self care. Among the elderly who are not poor, only 27 percent of those reporting any functional limitation reported one of these three severe categories.

These results confirm the poor health status of Medicaid eligibles of all ages and within all aid categories. There are suggestions as well that within the population of all persons in poor health, Medicaid eligibles have more severe health problems, particularly the noncash eligibles. Their higher rates of physician and prescribed medicine use, greater likelihood of hospitalization, as well as severity of functional limitations, point to such a conclusion.

These data also indicate that poor persons without Medicaid coverage, although generally in better health than the Medicaid population, are in significantly worse health than those who are not poor. Poor adults of all ages without Medicaid are more likely to be in fair or poor health and are more likely to have activity limitations (for those under age 65) and functional limitations (for those age 45 and over) than those who are not poor.

One approach to evaluating whether health care is equitably distributed in a population is to examine whether those with the greatest need for care obtain it (Aday, Andersen, and Fleming, 1980). Among persons in poor health, Medicaid coverage provides access to health care at levels comparable to those for persons in the U.S. population who are not poor. The importance of Medicaid coverage in obtaining care is illustrated by the reduced likelihood of seeing a physician and purchasing a prescribed drug among the population under age 65 who are in poor health, are poor, and have no Medicaid coverage. Medicare coverage of persons age 65 or over mitigates the effects of income on use for the poor elderly population. Rates of use by Medicaid eligibles in poor health, on the other hand, are equal to or often higher than for persons who are not poor. Mean numbers of physician visits and prescribed drugs purchased are especially high for noncash and State-only eligibles, the aid category containing medically needy eligibles.

Since 1980, considerable changes in the Medicaid program have occurred which have affected both the number of persons covered by Medicaid and the composition of the covered population. More recent national data are needed to evaluate whether the findings of this study hold under the current environment.

Acknowledgments

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Table 12

Measures of perceived health status, activity, and functional limitation, by Medicaid aid category: United States and four States, 1980

Item	Population in thousands	Percent with— Fair or poor health	Percent with— Any limitation of activity due to chronic condition	Percent with— Any functional limitation[1]
AFDC, cash				
Under 18 years:				
United States	9,603	6.8	(3)	—
California	829	[2]11.2	6.0	—
Michigan	461	[2]10.8	5.8	—
New York	693	[2]10.4	6.7	—
Texas	256	9.4	7.4	—
18 years or over:				
United States	4,452	29.7	11.7	23.6
California	382	27.7	9.7	22.8
Michigan	243	27.8	12.1	23.1
New York	370	37.8	9.5	28.7
Texas	100	[2]37.3	11.9	29.4
SSI blind or disabled, cash[4]				
United States	1,976	60.8	62.1	65.9
California	337	[2]73.4	62.0	[2]83.1
Michigan	67	66.9	54.6	73.3
New York	214	[2]75.0	56.4	[2]78.1
Texas	72	[2]72.4	54.9	[2]83.2
SSI aged, cash				
United States	2,298	52.4	54.4	79.6
California	283	49.6	[2]64.4	80.0
Michigan	32	60.2	55.8	73.6
New York	138	60.1	54.8	83.1
Texas	160	[2]65.9	48.1	85.1
Other[4,5]				
United States	4,795	43.2	35.8	50.7
California	513	39.0	[2]26.4	45.3
Michigan	114	45.8	28.6	49.7
New York	245	48.0	36.5	51.0
Texas	13	77.8	41.1	39.2

[1] Not asked of persons under 17 years of age. Excludes persons who died during the year.

[2] Significantly different at the .05 level from the total U.S. Medicaid population.

[3] Fewer than 20 cases or relative standard error greater than or equal to 50 percent.

[4] Only persons 18 years of age or over.

[5] All noncash eligibles and all State-only eligibles, both cash and noncash. Texas has no medically needy or State-only program and only a small number of noncash eligibles.

NOTES: AFDC is Aid to Families with Dependent Children; SSI is Supplemental Security Income.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the State Medicaid household survey, National Medical Care Utilization and Expenditure Survey, 1980.

Table 13

Use of physician services and prescribed drugs by perceived health status, functional limitation, and Medicaid aid category: United States and four States, 1980

Item	Persons in fair or poor health				Persons with a functional limitation[1]			
			Mean				Mean	
	Population in thousands	Percent with at least one physician visit	Physician visits	Prescribed drugs	Population in thousands	Percent with at least one physician visit	Physician visits	Prescribed drugs
AFDC, cash								
Under 18 years:								
United States	652	84.9	5.3	3.6	—	—	—	—
California	92	84.4	6.2	[2]2.3	—	—	—	—
Michigan	50	83.4	4.9	2.8	—	—	—	—
New York	72	93.7	6.9	3.7	—	—	—	—
Texas	24	79.0	4.6	[2]2.2	—	—	—	—
18 years or over:								
United States	1,324	92.6	8.2	9.1	1,049	91.0	9.1	11.5
California	106	91.0	8.9	[2]4.4	87	88.2	10.3	[2]5.4
Michigan	68	91.5	8.2	[2]5.8	56	87.9	8.8	[2]7.0
New York	140	86.4	10.9	[2]5.8	106	94.6	12.7	[2]6.7
Texas	37	86.4	7.4	[2]5.6	30	93.9	8.7	[2]6.7
SSI blind or disabled, cash[3]								
United States	1,201	80.3	10.6	19.5	1,303	77.2	9.7	18.4
California	247	[2]92.5	[2]15.8	[2]10.9	280	[2]90.1	[2]14.4	[2]10.2
Michigan	45	[2]93.4	12.0	[2]10.6	49	[2]94.0	11.2	[2]10.2
New York	160	[2]95.5	[2]19.9	[2]11.3	167	[2]93.5	[2]20.6	[2]10.7
Texas	52	90.1	11.3	[2]11.7	60	88.2	10.4	[2]10.9
SSI aged, cash								
United States	1,205	91.7	8.8	15.6	1,828	90.7	8.2	14.2
California	140	94.4	[2]13.6	[2]11.0	226	90.9	[2]12.1	[2]9.6
Michigan	19	94.0	9.5	[2]10.9	23	90.1	8.8	[2]10.6
New York	83	91.7	9.9	[2]9.6	114	91.3	9.1	[2]9.5
Texas	105	89.0	8.5	[2]11.2	136	88.8	7.6	[2]10.3
Other[3,4]								
United States	2,072	95.0	12.7	22.9	2,362	83.8	12.0	20.8
California	200	89.7	11.7	[2]7.3	213	[2]91.8	11.9	[2]7.5
Michigan	52	87.0	10.9	[2]10.0	54	[2]95.0	11.5	[2]11.0
New York	118	96.7	[2]19.4	[2]9.7	120	[2]95.7	[2]17.8	[2]9.0
Texas	10	86.9	8.8	[2]7.4	8	83.7	11.5	[2]9.0

[1] Not asked of persons under 17 years of age. Excludes persons who died during the year.

[2] Significantly different at the .05 level from the total U.S. Medicaid population.

[3] Only persons 18 years of age or over.

[4] All noncash eligibles and all State-only eligibles, both cash and noncash. Texas has no medically needy or State-only program and only a small number of noncash eligibles.

NOTES: AFDC is Aid to Families with Dependent Children; SSI is Supplemental Security Income.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the State Medicaid household survey, National Medical Care Utilization and Expenditure Survey, 1980.

Table 14

Use of hospital services by perceived health status, functional limitation, and Medicaid aid category: United States and four States, 1980

Item	Persons in fair or poor health: Population in thousands	Persons in fair or poor health: Percent with at least one admission	Persons in fair or poor health: Average hospital days per person	Persons with a functional limitation[1]: Population in thousands	Persons with a functional limitation[1]: Percent with at least one admission	Persons with a functional limitation[1]: Average hospital days per person
AFDC, cash[4]						
United States	1,324	28.9	4.1	1,049	31.0	3.1
California	106	23.6	1.5	87	(2)	1.0
Michigan	68	30.8	3.2	56	29.6	3.7
New York	140	[3]14.5	[3].8	106	(2)	[3].7
Texas	37	33.1	4.1	30	34.1	4.4
SSI blind or disabled, cash[4]						
United States	1,201	27.0	5.6	1,303	26.6	5.2
California	247	28.1	4.1	280	25.4	3.6
Michigan	45	30.4	6.0	49	33.2	6.9
New York	160	25.6	6.2	167	25.0	5.8
Texas	52	[3]43.2	8.1	60	37.0	6.2
SSI aged, cash						
United States	1,205	30.2	5.5	1,828	28.8	5.8
California	140	40.5	5.6	226	32.6	3.9
Michigan	19	30.4	7.2	23	22.6	4.8
New York	83	21.4	6.0	114	23.3	5.0
Texas	105	37.0	5.7	136	34.7	5.2
Other[4,5]						
United States	2,072	40.3	9.3	2,432	38.8	8.2
California	200	[3]28.4	[3]4.1	232	[3]26.0	[3]4.5
Michigan	52	36.1	6.2	57	34.4	6.5
New York	118	[3]28.3	[3]5.0	125	[3]23.5	[3]4.2
Texas	(2)	(2)	(2)	(2)	(2)	(2)

[1] Not asked of persons under 17 years of age. Excludes persons who died during the year.

[2] Fewer than 20 cases or relative standard error greater than or equal to 50 percent.

[3] Significantly different at the .05 level from the total U.S. Medicaid population.

[4] Only persons 18 years of age or over.

[5] All noncash eligibles and all State-only eligibles, both cash and noncash. Texas has no medically needy or State-only program and only a small number of noncash eligibles.

NOTES: AFDC is Aid to Families with Dependent Children; SSI is Supplemental Security Income.

SOURCE: Health Care Financing Administration and National Center for Health Statistics: Data from the State Medicaid household survey, National Medical Care Utilization and Expenditure Survey, 1980.

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Health care use by Medicare's disabled enrollees

by James Lubitz and Penelope Pine

Three million persons under age 65 are entitled to Medicare because of disability. This study examines their Medicare use and mortality. Disabled enrollees had higher health care use and mortality than comparison groups of Medicare's aged enrollees or of the general population under age 65. One type of disabled enrollee, adults disabled as children (over one-half of whom are mentally retarded) show lower use rates than the other types of enrollees—workers and widows. High mortality of the disabled during the 2-year waiting period for Medicare suggests the need to investigate how they pay for care during this period.

Introduction

In the last major expansion of health care coverage by the Federal Government, the Social Security Amendments of 1972 extended Medicare to persons who had been receiving social security disability insurance benefits for 24 months, and to persons with end-stage renal disease (ESRD). Coverage for these individuals began on July 1, 1973, with 1.7 million disabled persons under age 65 becoming entitled to Medicare. Extension of Medicare coverage to disabled social security beneficiaries was motivated by congressional concern over the low level of health insurance protection for this vulnerable group. Surveys by the Social Security Administration in 1960, 1966, and 1972 had shown that disabled persons, including social security disability beneficiaries, were in poorer health, used more health care services, had less private health insurance coverage, and had higher out-of-pocket expenses for health services than the nondisabled population (Krute and Burdette, 1981; Stanley and Swisher, 1969; Brehm and Cormier, 1970; Duchnok, 1981; Ferron, 1981; Advisory Council on Social Security, 1965). Prior to the passage of Medicare, the Advisory Council on Social Security (1965) had recommended the provision of hospital insurance for the disabled, as well as the aged, through social security. In making its recommendation, the Advisory Council took into account the limited incomes, higher health care costs, and limited health insurance protection of the disabled. Medicare coverage for the disabled was considered by Congress in 1967 and was recommended by Advisory Councils in 1969 and in 1971 (Advisory Council on Health Insurance for the Disabled, 1969; Advisory Council on Social Security, 1971).

It is important to examine Medicare's disabled population because of large expenditures for the disability program.[1] Heightened interest also stems from recent controversies about the large number of terminations resulting from disability reviews, and from current proposals for changes in social security and Medicare which would affect disabled beneficiaries. Previous studies of the Medicare program have focused on aged beneficiaries or on beneficiaries with ESRD.

The purpose of this article is to analyze the use of Medicare services by the disabled and to examine the relationship between disability and health services use. This study goes beyond previous analyses of health care use by Medicare disability beneficiaries in four ways:

- It removes enrollees with ESRD from the study population whether they were entitled to Medicare because of the ESRD provisions of the Social Security Amendments of 1972 or because of the disability provisions (i.e., entitlement to social security disability benefits for 24 months). About one-half of all enrollees under age 65 with ESRD are entitled because of each provision. All enrollees under age 65 with ESRD were excluded because their high mortality and health care use would skew the findings for the disability population as a whole. Medicare beneficiaries with ESRD have been studied elsewhere (Eggers, Connerton, and McMullan, 1984; Eggers, 1984).
- It analyzes Medicare use by the three different types of Medicare disability beneficiaries; workers, widows and widowers, and adults disabled as children.
- It analyzes Medicare use by aged beneficiaries who were formerly entitled to Medicare because of disability to see if patterns of health care use persist after they change their basis for Medicare entitlement.
- It analyzes the relation of Medicare use by the disabled to the length of time entitled to Medicare.

Also presented is background material on the Social Security Disability Insurance program for persons not familiar with it.

An understanding of the disabled population and its health care use is vital to assessing the impact on beneficiaries of past and proposed changes to Medicare and social security. For example, one proposal would gradually raise the age of Medicare entitlement to 67 years, which would be in line with the already mandated rise in the age for social security

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[1] Federal expenditures related to the social security disability program totaled $25.4 billion in 1984, $17.9 billion from the Disability Trust Fund, and $7.5 billion from the Medicare Trust Fund.

entitlement (Advisory Council on Social Security, 1983). Data cited in this article show that if the retirement age for social security were raised, a substantial number of persons would be expected to retire on disability at ages 65 and 66—persons who would have no Medicare coverage because of the 2-year waiting period required between entitlement to social security disability benefits and to Medicare. Congress has already recognized the potential of an adverse effect from the increased retirement age on individuals who would not be able to continue working past 65 years of age. In the Social Security Amendments of 1983 (section 201) it called for a study with " . . . recommendations with respect to the provision of protection against the risks associated with early retirement due to health considerations . . . ".

Another area in which knowledge of patterns of health care use by disabled enrollees may become important is in setting prices for capitation in Medicare. Regulations to implement the health maintenance organization (HMO) and comprehensive medical plan (CMP) provisions of the Tax Equity and Fiscal Responsibility Act of 1982 were issued in January 1985. HMO's and CMP's are expected to play an increasingly important role in serving Medicare beneficiaries. This article shows that different subgroups of the disabled have distinct patterns of use of Medicare services. The current payment formula for HMO's and CMP's (known as the adjusted average per capita cost or AAPCC formula) does not adjust for the different levels of use by these subgroups. Thus, HMO's or CMP's attracting a disproportionate share of subgroups with lower-than-average use would be overpaid under the current formula and those attracting a disproportionate share of subgroups with higher-than-average use would be underpaid. Knowledge of use patterns by the disabled, therefore, might be used to improve Medicare's pricing formula for capitation.

Entitlement

To understand the nature of the Medicare disabled population under age 65 and their health care use, it is necessary to understand the Social Security Disability Insurance program. As previously mentioned, persons entitled to cash disability benefits for 24 months automatically become entitled to Medicare coverage. The Social Security Disability Insurance program was established in 1956 to provide cash benefits to disabled workers. To be eligible for benefits as a disabled worker an individual must meet the insured status requirements regarding length of time in social security covered employment applicable to his or her age. In addition, the worker must meet the social security definition of disability which is:

> "The inability to engage in any substantial gainful activity by reason of any medically determinable physical or mental impairment which can be expected to result in death or which has lasted or can be expected to last for a continuous period of not less than 12 months. A person must be not only unable to do his or her previous work or work commensurate with the previous work (e.g., amount of earnings and utilization of capacities) but cannot, considering age, education, and work experience, engage in any other kind of substantial gainful work which exists in the national economy. It is immaterial whether such work exists in the immediate area, or whether a specific job vacancy exists, or whether the worker would be hired if he or she applied for work.
>
> In making a determination, the worker's impairment or impairments must be the primary reason for his or her inability to engage in substantial gainful activity, although age, education, and work experience are also taken into consideration." (Social Security Administration, 1984).

At present, the substantial gainful activity level is $300 per month in earnings. There is a 5-month waiting period between the date disability was determined to have begun and receipt of social security benefits.

In addition to disabled workers there are two other categories of disabled social security beneficiaries—adults disabled as children (ADC) and disabled widows or widowers. ADC beneficiaries must have been disabled before age 22 and must be the dependent child of a parent who is receiving social security disability or retirement benefits, or of a parent who died while insured under social security. ADC beneficiaries must meet the same definition of disability as disabled workers. The minimum age for eligibility as an ADC beneficiary is 18.

For disabled beneficiaries who are widows or widowers of workers who were insured at their death, the minimum age of eligibility is 50. The definition of disability is stricter for disabled widows and widowers than for workers or ADC. Disabled widow(er)s must not be able to engage in any gainful activity (as opposed to the substantial gainful activity definition for workers and ADC). Furthermore, age, education, and work experience are not considered in determining eligibility for widows or widowers, as they are for workers and ADC (Social Security Administration, 1984).

The Social Security Disability Insurance program is designed to assist persons who cannot work at all. The definitions of disability for purposes of entitlement to social security benefits have programmatic elements such as social security coverage and minimum and maximum ages of entitlement, as well as medical evidence requirements. In addition, for workers and ADC applicants who do not qualify solely on the basis of medical reasons, factors such as age, education, skills, and experience are considered in determining whether the applicant's disability prevents work. Thus, the social security (and hence Medicare) definition of disability is different from measures of disability used in medicine and sociology such as functional status or self-reported disability. Many persons who would be classified as disabled by a variety of measures would not qualify as social security disability recipients.

The other class of disabled persons who receive benefits from the Federal Government are those entitled under the Supplemental Security Income (SSI) program. The definition of disability is basically the same for SSI and for social security. SSI is a means-tested program that is funded from general revenues. Also, recipients' income must not exceed certain limits. At the end of 1983, 2.2 million disabled persons were receiving Federal SSI payments. Some persons are covered under both programs. For instance, 10.5 percent of social security's disabled workers also received SSI payments in 1983.

Issues and trends

Certain aspects of social security's disability program have been of concern. Considerable public debate has been generated by the steady rise in the number of beneficiaries in the early and mid-1970's and by the recent controversies over benefit terminations. On the one hand, there is recognition of the need for a program to help with financial support and medical expenses for persons unable to work. On the other hand, there appears to be economic and social circumstances that influence workers' decisions to apply for benefits. The complexity of making disability determinations is illustrated by the substantial percent of awards made on appeal after denial at the initial level (35 percent of total awards in 1980) and by findings of high rates of disagreement on disability determinations when different reviewers review the same cases (Lando, Farley, and Brown, 1982; Social Security Administration, 1982).

In recent years, there have been several important trends in the Social Security Disability Insurance program (Lando, Farley, and Brown, 1982; Office of Research, Statistics, and International Policy, 1984). After a steady rise in disability awards to workers from 253,000 persons in 1965 to 592,000 in 1975, the annual number of awards declined to 311,000 in 1983. Reflecting the trends in awards, the number of disabled workers on the disability insurance rolls rose from 1.0 million in 1965 to 2.9 million in 1978 and then declined to 2.6 million in 1983. There has also been a dramatic drop in the percent of awards based on initial determinations on applications for disability. In 1965, 49 percent of initial determinations resulted in an award of benefits; in 1980, only 22 percent resulted in an award. As a result of the decline in the initial allowance rate, many more cases are being appealed to and allowed at higher levels.

Part of the reason for the drop in the initial allowance rate seems to have been tighter administration of the disability program in reaction to the sharp increase in the number of awards in the early 1970's (Social Security Administration, 1982). Under a 1980 law, the Social Security Administration (SSA) began to review the continued eligibility of every beneficiary (except the permanently disabled) every 3 years. (SSA had previously reviewed only about 5 percent of the cases annually.) This led to record numbers of terminations of benefits, concern about resulting hardships, and the implementation of administrative reforms in the review process (Demkovich, 1984). The Social Security Disability Benefits Reform Act of 1984, which made it more difficult to remove disability beneficiaries from the rolls, was signed into law in October 1984.

Characteristics of beneficiaries

The 1978 Survey of Disability and Work (Lando, Cutler, and Gamber, 1982) found an estimated 10.9 million severely disabled persons 18-64 years of age in the U.S. population. Of these 10.9 million persons, 2.9 million or 27 percent were social security disability beneficiaries (Table 1). The Survey defined "severely disabled" persons as those who reported being

Table 1

Noninstitutionalized persons 18-64 years of age and severely disabled persons, by selected measures: United States, 1978

		Severely disabled persons		
Measure	Total population 18-64 years	Total	Social security disability insurance beneficiary	Non-social security beneficiary
Number in millions	127.0	10.9	2.9	7.9
Percent 55-64 years	16.0	46.4	57.7	42.2
Percent male	49.6	43.2	65.9	34.7
Percent below poverty level	8.1	22.1	15.8	24.5
Percent black	10.6	16.8	14.0	17.8
Percent housebound	2.3	8.1	7.7	8.2
Median years of schooling completed	12	10	10	10

SOURCE: (Lando, Cutler, and Gamber, 1982).

"unable to work altogether or unable to work regularly." Virtually all social security disability beneficiaries were automatically classified as severely disabled by the Survey. The other less severe categories of disability were the "occupationally disabled" and those with "secondary work limitations."

Severely disabled persons, both social security beneficiaries and nonbeneficiaries, were older than the general population. Among this group, there was also a lower percent of males, a higher percent of black people, a higher percent living below the poverty level, and a higher percent housebound. They also had less education then the general population.

Among the severely disabled, social security beneficiaries and nonbeneficiaries had the same median education (10 years) and about the same percent housebound (7.7 and 8.2). But social security beneficiaries were older than nonbeneficiaries (57.7 percent versus 42.2 percent were 55-64 years of age), had a much higher percent of males (65.9 versus 34.7), a much lower percent living below the poverty level (15.8 versus 24.5), and a lower percent of black people (14.0 versus 17.8). The higher percent of males among social security beneficiaries compared with other severely disabled persons is a result of the historically greater labor force participation by men. The lower percent of SSA beneficiaries below the poverty level probably results from their receipt of social security benefits.

The two most common major disabling conditions found in the 1978 Survey for disability beneficiaries were diseases of the circulatory system (28 percent of beneficiaries) and diseases of the musculoskeletal system (27 percent). Other leading major disabling conditions were mental disorders, diseases of the nervous system and sense organs, and diseases of the respiratory system, each reported by about 9 percent of disability beneficiaries (Lando, Cutler, and Gamber, 1982).

Data sources and methods

Most of the data for this study come from a longitudinal file of Medicare enrollees known as the Continuous Medicare History Sample (CMHS). The CMHS was used to provide a cross-sectional view of the Medicare disabled population in 1978. The file (which begins with 1974 data) records the continuing experience of a 5-percent probability sample of Medicare enrollees selected by their identification numbers. The file is part of the Medicare Statistical System, which collects information from Medicare claims for services submitted by physicians, hospitals, and other providers. New enrollees whose identification numbers place them in the CMHS are added to the sample, and the records of enrollees who die are retained in the file. Information on the use of Medicare services is appended to enrollees' records in periodic updates. Because the data are based on a sample of enrollees, there are sampling errors associated with the estimates.[2]

The data are limited to the use of Medicare-covered services. Medicare covers the following services:

- Hospital inpatient.
- Skilled nursing facility.
- Home health agency.
- Physician and other medical.
- Hospital outpatient.

Services of importance not covered by Medicare are nursing home care below the skilled level and drugs for outpatients.

As previously mentioned, disabled enrollees with ESRD were excluded from the study. Out of a total of 2.8 million disabled Medicare enrollees under 65 years of age in 1978, 36,357 were identified as ESRD patients. Aged enrollees with ESRD (less than 0.1 percent of the total aged) were also excluded.

The different types of disabled beneficiaries (worker, ADC, widow(er)s) have different sets of Medicare identification numbers. This permitted analysis by type of beneficiary. To compare the use of services by disabled beneficiaries to aged Medicare beneficiaries, data also were generated for the aged. Information on the original reason for entitlement to Medicare was used to identify aged enrollees previously entitled to Medicare because of disability in order to study their use of services.

Some Medicare use data for 1981 is given. However, because of limitations in the systems that maintain the CMHS, utilization data for widow(er)s in 1981 were incomplete. Thus, 1978 data are used for breakdowns of Medicare use by type of disabled beneficiary.[3]

In addition to the CMHS, data from the Continuous Disability History Sample, maintained by the Social Security Administration, and from the 1978 Survey of Disability and Work conducted by the Social Security Administration are also used in this article to provide information on the characteristics of social security disability insurance beneficiaries.

Findings

Aged and disabled enrollees

On July 1, 1973, the first day of Medicare entitlement for disabled beneficiaries, there were 1.7 million disabled persons under 65 years of age (including ESRD beneficiaries) enrolled in Medicare. From 1973 to 1981, disability enrollment grew at a much faster rate than aged enrollment. By 1981, there were 3.0 million disabled enrollees, reflecting an average annual increase of 7 percent; from 1973 to 1981, enrollment of aged beneficiaries grew at an average annual rate of 2.2 percent. From 1981 to 1984, the number of disabled enrollees declined to 2.9 million and the number of aged enrollees continued to increase. The decline in Medicare disability enrollment reflects the previous decline in the number of persons on the social security disability rolls.

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[2] Sampling error tables are available from the authors.

[3] Data for 1981 on Medicare use for workers and ADC are available from the authors.

There were 2.8 million disabled enrollees in 1981 (which excludes enrollees with ESRD), and they accounted for $4.0 billion in Medicare reimbursements (Table 2). There were 25.1 million enrollees 65 years of age and over (excluding enrollees with ESRD), and they accounted for $32.9 billion in Medicare reimbursements. Thus, disabled enrollees made up 11 percent of the Medicare population and accounted for 12 percent of Medicare reimbursement.

Disabled enrollees as a whole have a rate of Medicare reimbursements per enrollee similar to aged enrollees, $1,393 for disabled and $1,292 for aged enrollees. But when utilization is compared for disabled and aged enrollees closest in age, it becomes clear that the disabled are much higher users of Medicare services than would be expected given their age alone. Reimbursement per enrollee for disabled enrollees 60-64 years of age was $1,510, and for enrollees 65-69 years of age it was $962, a 60-percent difference. The pattern of reimbursement by sex for disabled enrollees was opposite that for aged enrollees. For example, among disabled enrollees 60-64 years of age reimbursement per enrollee was higher for females than males ($1,561 and $1,476, respectively); among aged enrollees 65-69 years of age, reimbursement per enrollee was higher for males than females ($1,041 and $897, respectively).

Aged enrollees as a whole also have a higher mortality rate than disabled enrollees—52 deaths per 1,000 aged enrollees versus 31 deaths per 1,000 disabled enrollees. When death rates are compared for groups closest in age, however, this pattern is reversed. The death rate of 45 per 1,000 enrollees for the disabled group 60-64 years of age was nearly twice the rate of 24 per 1,000 for aged enrollees 65-69 years of age. Thus, a comparison of use and mortality of disabled with aged enrollees close in age confirms that the disabled are in much poorer health than their aged counterparts.

Medicare use by type of beneficiary

In 1978, there were 2.7 million disabled persons covered under Medicare for reasons other than ESRD (Table 3). Of these, 2.2 million (80 percent) were disabled workers, 107,000 were disabled widows (4 percent),[4] and 369,000 (14 percent) were ADC. The age and sex make up of each type of beneficiary group is quite different. The number of disabled workers rises with age. Only 164,000 (7 percent) were under 35 years of age, whereas 749,000 (34 percent) were 60-64 years of age. Most were males (67 percent), reflecting their higher labor force participation. The minimum age for eligibility for Medicare for disabled widows is 52 because the minimum age for eligibility for social security disabled widows benefits is 50 and there is a 2-year waiting period for Medicare. Most disabled widows (65,000 or 61 percent) were 60-64 years of age.

The age distribution of ADC beneficiaries is the reverse of disabled workers and widows. The 159,000 ADC beneficiaries under 35 years are 43 percent of the total. The number of ADC beneficiaries declines with increasing age and only 17,000 (4 percent) were

Table 2

Medicare enrollment, reimbursements, and mortality for disabled and aged enrollees, and ratio of disabled to aged by selected age groups and sex: 1981

Sex	Disabled		Aged		Ratio	
	All persons	60-64 years	All persons	65-69 years	All disabled to all aged	Disabled 60-64 years to aged 65-69 years
	Number of enrollees in millions					
All persons	2.8	.9	25.1	8.4	—	—
Male	1.8	.5	10.1	3.8	—	—
Female	1.0	.4	14.9	4.6	—	—
	Reimbursements in billions					
All persons	$4.0	$1.3	$32.9	$8.2	—	—
Male	2.4	.8	14.1	4.0	—	—
Female	1.6	.5	18.8	4.2	—	—
	Reimbursements per enrollee					
All persons	$1,393	$1,510	$1,292	$962	1.1	1.6
Male	1,309	1,476	1,383	1,041	.9	1.4
Female	1,537	1,561	1,232	897	1.2	1.7
	Deaths per 1,000 enrollees					
All persons	31	45	52	24	.6	1.9
Male	36	54	63	33	.6	1.6
Female	22	32	44	17	.5	1.9

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System.

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[4] A small number of disabled widowers are also entitled to Medicare. Because there were less than 1,000 disabled widowers, they are not analyzed separately.

60-64 years of age. There were more male than female ADC beneficiaries in the two youngest age groups; we can offer no explanation for this.

Overall reimbursement per disabled enrollee was $849 in 1978 (Table 4). Reimbursement per enrollee was highest for widows ($1,051), followed by workers ($924), and lowest for ADC ($345). The relatively low reimbursement rate for the ADC group at every age-sex group probably reflects the fact that over one-half of ADC are mentally retarded (Cormier, 1972; Schmulowitz, 1985). The low reimbursement rate for the ADC group may be because of their lesser need for care for physical problems, compared with disabled workers and widows, and to Medicare coverage limitations on the types of care necessary for these beneficiaries, especially limitations on custodial care and on ambulatory mental health services. In addition, about 25 percent of the ADC population are institutionalized (Cormier, 1985). The need for acute hospital services may be less for persons already receiving institutional care.

Reimbursement per enrollee for disabled workers is higher at every age group for females than males. In the general population under age 65, per capita health care expenses are also higher for females than males. (National Center for Health Statistics, 1980). Reimbursement rates increased moderately for successively older age groups of male workers from $732 for disabled workers under age 35 to $952 for those 60-64 years of age. For disabled female workers, reimbursement per enrollee was virtually the same for each age group. For disabled widows, reimbursement per enrollee was also virtually the same for each age group. Reimbursement rates for widows were similar to those for disabled female workers.

Short-stay hospital use

In 1978, the overall discharge rate from short-stay hospitals for disabled enrollees was 356 per 1,000 enrollees (Table 5). This was higher than the rate of 328 discharges per 1,000 enrollees for aged enrollees and considerably above the rate of 250 discharges per 1,000 for aged enrollees 65-69 years of age. (Data not shown in table). The rate was highest for disabled widows (414 per 1,000), followed by disabled workers (390 per 1,000) and ADC (142 per 1,000). At every age, discharge rates were higher for disabled female workers than for disabled male workers. The discharge rate was higher for successively older age groups for male workers, but for female workers the rate declined after 35-44 years of age. The discharge rates for disabled widows were similar to those for disabled female workers.

The discharge rates for the ADC enrollees were less than one-half as large as the rates for workers and widows for all age-sex groups. For both males and females in the ADC group, the discharge rate declined from the youngest group, persons under 35 years, to the next group, persons 35-44 years of age; then the rate rose again for persons 45-54 years of age.

Table 3

Number of disabled Medicare enrollees under age 65, by type of beneficiary, sex, and age: July 1, 1978

Sex and age	Total	Type of beneficiary		
		Worker	Widow	Adults disabled in childhood
			Number in thousands	
All persons	2,675	2,188	107	369
Under 35 years	324	164	—	159
35-44 years	312	218	—	93
45-54 years	616	532	8	74
55-59 years	588	525	34	27
60-64 years	835	749	65	17
Male	1,677	1,470	—	203
Under 35 years	214	121	—	92
35-44 years	208	155	—	53
45-54 years	400	362	—	38
55-59 years	359	345	—	13
60-64 years	496	488	—	8
Female	998	717	106	165
Under 35 years	111	44	—	66
35-44 years	104	63	—	40
45-54 years	215	170	8	36
55-59 years	229	179	34	14
60-64 years	339	261	65	9

NOTE: The sum of types of beneficiary does not add to total because widows and ADC enrollees could not be identified for a small group of Railroad Board enrollees. Parts may not add to totals because of rounding. The minimum age for Medicare entitlement for disabled widows is 52 years. A small number of disabled widowers are also entitled to Medicare. Because there were less than 1,000 disabled widowers they are not analyzed separately. They are included in the total for widows.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System.

Table 4

Medicare reimbursement per disabled enrollee under age 65, by type of beneficiary, sex, and age: 1978

	Type of beneficiary			
Sex and age	Total	Worker	Widow	Adults disabled in childhood
	Reimbursement per enrollee			
All persons	$849	$924	$1,051	$345
Under 35 years	588	826	—	344
35-44 years	689	860	—	289
45-54 years	803	856	1,142	382
55-59 years	901	913	1,017	418
60-64 years	1,007	1,020	1,017	396
Male	763	823	—	332
Under 35 years	552	732	—	319
35-44 years	622	734	—	299
45-54 years	701	736	—	359
55-59 years	788	801	—	427
60-64 years	944	952	—	434
Female	993	1,132	1,049	361
Under 35 years	657	1,083	—	378
35-44 years	823	1,172	—	276
45-54 years	992	1,109	1,145	405
55-59 years	1,076	1,129	1,086	411
60-64 years	1,100	1,146	1,017	363

NOTES: The minimum age for Medicare entitlement for disabled widows is 52 years of age. A small number of disabled widowers are also entitled to Medicare. Because there were less than 1,000 disabled widowers they are not analyzed separately. They are included in the total for widows.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System.

Table 5

Short-stay hospital discharges per 1,000 persons for Medicare disabled enrollees and the U.S. population, and ratio of disabled to U.S. population, by sex and age: 1978

	Medicare disabled enrollees					
Sex and age	Total	Worker	Widow	Adults disabled in childhood	U.S. population 15-64 years	Ratio of total disabled to U.S. population
	Discharges per 1,000 persons					
All persons	356	390	414	142	143	2.5
Under 35 years	234	319	—	147	112	2.1
35-44 years	297	377	—	112	147	2.0
45-54 years	359	386	454	154	175	2.1
55-59 years	380	388	426	172	[1]214	[1]1.8
60-64 years	406	412	403	170		
Male	333	361	—	135	118	2.8
Under 35 years	216	279	—	135	88	2.5
35-44 years	272	329	—	106	123	2.2
45-54 years	333	352	—	160	163	2.0
55-59 years	350	357	—	159	[1]225	[1]1.7
60-64 years	396	400	—	164		
Female	395	450	415	152	159	2.5
Under 35 years	269	428	—	163	135	2.0
35-44 years	348	496	—	119	169	2.1
45-54 years	407	460	455	149	185	2.2
55-59 years	428	449	427	183	[1]204	[1]2.1
60-64 years	421	436	403	176		

[1] This number applies to the age group 55-64 years of age.

NOTES: The minimum age for Medicare eligibility is 52 years for disabled widows. A small number of disabled widowers are also entitled to Medicare. Because there were less than 1,000 disabled widowers they are not analyzed separately. They are included in the total for widows. Data on discharges for females in the U.S. population exclude deliveries. Among disabled females, the discharge rate for the *Eighth Revision International Classification of Disease, Adapted for Use in the United States*, category of "complications of pregnancy, childbirth, and the puerperium" was only 8 per 1,000, compared with 85 per 1,000 in the general population.

SOURCES: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System; Data for the U.S. population are from (Haupt, 1980).

Data from the National Center for Health Statistics (1982) on hospital discharge rates by the general population 15-64 years of age were compared with hospital use rates by Medicare disabled enrollees. Overall, the hospitalization rate for disabled enrollees was 2.5 times that of the general population. The discharge rates for disabled workers and widows were more than twice as high as the rates for the general population for nearly all age-sex groups, reflecting their poorer health. However, for ADC enrollees the discharge rates were somewhat lower for most age-sex categories than the rates for the general population. The lower discharge rates probably reflect the high rates of mental retardation and institutionalization in this population, mentioned earlier.

By far, the most common reason for hospitalization for disabled enrollees is diseases of the circulatory system, accounting for 83 discharges per 1,000 enrollees or 23 percent of all discharges (Table 6). Other common discharge diagnoses were diseases of the respiratory system and diseases of the digestive system, each accounting for 11 percent of total discharges. The main reasons for hospitalization for disabled workers and widows were the same as for all disabled enrollees. For ADC enrollees, however, the main reasons for hospitalization were diseases of the digestive system (21 discharges per 1,000 enrollees) and mental disorders (18 discharges per 1,000 enrollees). The differences in discharge diagnoses between ADC and other disabled enrollees reflect in large part their younger age and the large percent of mentally retarded in this group.

Table 6

Short-stay hospital discharges per 1,000 persons and percent distribution for Medicare disabled enrollees and the U.S. population, by diagnosis: 1978

		Medicare disabled					U.S. population 45-64 years[2]	
Diagnostic group	ICDA-8[1] code(s)	Total	Workers	Widows	Adults disabled in childhood	Percent distribution	Discharges per 1,000 persons	Percent distribution
		Discharges per 1,000 persons						
Total, all discharges	—	356	390	414	142	100	193	100
Malignant neoplasms	140-209	21	23	26	2	6	15	8
Diabetes mellitus	250	12	13	28	2	3	5	3
Mental disorders	290-315	26	28	15	18	7	11	6
Diseases of the nervous system and sense organs	320-389	17	17	16	11	5	9	5
Diseases of the circulatory system	390-458	83	94	107	11	23	38	20
Heart and hypertensive disease	393-429	(60)	(68)	(76)	(6)	(17)	(NA)	(NA)
Chronic ischemic heart diseases	412	(24)	(28)	(25)	(2)	(7)	(11)	(6)
Diseases of the respiratory system	460-519	40	44	52	13	11	16	8
Diseases of the digestive system	520-577	39	42	42	21	11	29	15
Diseases of the genitourinary system	580-629	21	22	23	12	6	19	10
Diseases of the musculoskeletal system and connecting tissue	710-738	21	24	22	5	6	15	8
Symptoms and ill-defined conditions	780-796	21	23	21	10	6	4	2
Accidents, poisoning, and violence	800-999	25	27	26	14	7	15	8
Residual	—	30	33	36	23	8	17	9

[1] *Eighth Revision International Classification of Diseases, Adapted for Use in the United States.*

[2] Hospital use by diagnosis for the disabled was compared to that of the general population 45-64 years of age because 76 percent of the disabled are in that age group.

NOTE: Parts may not add to totals due to rounding.

SOURCE: Data on Medicare enrollees are from the Health Care Financing Administration, Bureau of Management and Strategy: Data from the Medicare Statistical System. Data for the U.S. population are from McCarthy, 1981.

Table 7

Number of deaths per 1,000 persons for Medicare disabled enrollees and the U.S. population 20-64 years of age, and ratio of disabled to U.S. population, by sex and age: 1978

	Medicare disabled enrollees					
Sex and age	Total	Workers	Widows	Adults disabled in childhood	U.S. population 20-64 years	Ratio of total disabled to U.S. population
	Number of deaths per 1,000 persons					
All persons	33	37	31	10	5	7.2
Under 35 years	10	12	—	8	1	7.1
35-44 years	15	19	—	6	2	6.3
45-54 years	29	32	15	15	6	4.8
55-59 years	38	40	34	16	11	3.4
60-64 years	49	51	32	29	18	2.8
Male	39	43	—	11	6	6.4
Under 35 years	10	12	—	8	2	5.0
35-44 years	17	21	—	6	3	5.5
45-54 years	36	38	—	17	8	4.5
55-59 years	45	46	—	21	15	3.0
60-64 years	59	60	—	31	24	2.4
Female	24	26	31	9	3	7.5
Under 35 years	9	13	—	7	1	12.8
35-44 years	11	15	—	5	2	6.5
45-54 years	18	20	13	13	4	4.2
55-59 years	27	27	34	11	8	3.5
60-64 years	33	33	32	27	12	2.7

NOTES: The minimum age for Medicare eligibility for disabled widows is 52. A small number of disabled widowers are also entitled to Medicare. Because there were less than 1,000 disabled widowers they are not analyzed separately. They are included in the total for widows. Ratios were computed on unrounded numbers and may differ from ratios computed on the rounded numbers shown in the table.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System; (National Center for Health Statistics, 1982).

The discharge rate for the disabled is greater than the rate for the general population 45-64 years of age[5] for virtually all diagnostic groups, but the percent distribution of discharges by diagnostic group among the general population and among disabled enrollees are not dissimilar. The leading cause for hospitalization for both groups was diseases of the circulatory system, accounting for 23 percent of total discharges for the Medicare disabled and 20 percent in the general population. Discharges for most other conditions also accounted for similar percentages of the total for disabled enrollees and the general population. Thus, although the rate of hospitalization for disabled enrollees is much greater than that of the general population their age, the patterns of hospitalization by diagnosis are generally similar.

Mortality rates

As would be expected, the mortality rates for disabled Medicare enrollees are considerably higher than for the population as a whole. The death rate for disabled enrollees in 1978 was 33 per 1,000 enrollees, a figure 6.6 times the rate of 5 per 1,000 persons in the general population 20-64 years of age (Table 7). Although the death rates increased with successively older age groups, the relative difference was greatest at the younger ages. As shown in the last column of the table, the mortality rate of disabled enrollees under age 35 was 7.1 times that of the general population; the mortality rate of disabled enrollees 60-64 years of age was 2.8 times that of the general population. The mortality rates for disabled male enrollees were higher at each age group than the rates for females, just as the overall rates for the U.S. population 20-64 years of age were consistently higher for males than females. The higher mortality rates for disabled males, compared with females, contrast with their lower per capita Medicare reimbursement and hospital use found earlier.

Mortality rates for the ADC group were considerably lower than for disabled workers or widows for all age-sex groups. Nonetheless, the mortality rates for the ADC enrollees in each age-sex group were much higher than the rates for the general population.

An interesting relation between mortality and hospital use was observed for ADC enrollees. As already noted, hospital discharge rates for this group were generally slightly lower than for the general population. However, mortality rates for ADC enrollees were higher than the general population rates. A reason that their higher mortality may not be reflected in higher hospital use may be that many ADC enrollees are in institutions for the mentally retarded where they may receive care that they would otherwise need to obtain in a hospital.

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[5] Hospital use by diagnosis for the disabled was compared to that of the general population 45-64 years of age because 76 percent of the disabled are in that age group.

Table 8

Medicare enrollment, reimbursements, and mortality for formerly disabled Medicare enrollees and other groups, and ratio of formerly disabled to aged, by selected age groups and sex: 1981

Sex	Formerly disabled 65-69 years	Disabled 60-64 years	Aged 65-69 years	Ratio of formerly disabled 65-69 years to aged 65-69 years
	Number of enrollees in thousands			
All persons	837	886	8,408	—
Male	502	535	3,796	—
Female	335	351	4,612	—
	Reimbursement per enrollee			
All persons	$1,866	$1,510	$962	1.9
Male	1,821	1,476	1,041	1.7
Female	1,934	1,561	897	2.2
	Deaths per 1,000 enrollees			
All persons	58	45	24	2.4
Male	71	54	33	2.2
Female	40	32	17	2.4

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Data from the Medicare Statistical System.

Formerly disabled enrollees

About 11 percent of aged persons who become entitled to Medicare each year are persons who were formerly entitled to Medicare under age 65 because of disability. How does their use of Medicare services compare with that of other aged Medicare enrollees?

In 1981, there were 837,000 aged enrollees who were formerly entitled to Medicare because of disability out of a total of 8.4 million enrollees 65-69 years of age[6] (Table 8). Reimbursement per enrollee for the formerly disabled 65-69 years of age ($1,866) was 1.9 times higher than the average of $962 per enrollee. Their mortality rates were 2.4 times higher. The reimbursement and mortality rates of the formerly disabled 65-69 years of age are similar to, but somewhat higher than, that of disabled enrollees 60-64 years of age. The reimbursement per enrollee for the formerly disabled was $1,866, compared with $1,510 for disabled enrollees 60-64 years of age; number of deaths per 1,000 enrollees was 58 for the formerly disabled, compared with 45 for the disabled 60-64 years of age. Thus, as might be expected, the ill health that led to disability entitlement under age 65, continues to result in higher use of Medicare benefits and higher mortality rates after age 65.

Patterns through time

As noted earlier, SSA disability beneficiaries must wait 2 years from award of disability benefits to Medicare entitlement. What is the effect of this waiting period on the population becoming entitled to Medicare? The death rates in the waiting period are much higher than in subsequent years (Schobel, 1980). For example, during the period 1975-78, age-adjusted death rates per 1,000 persons for male disabled workers were 86.3 in the first year of SSA entitlement, 55.1 in the second year, but leveled off at around 45 in the third, fourth, and fifth years. Mortality in the waiting period varies dramatically by reason for disability (Table 9). Overall, 11 percent of disabled persons die in the 2-year waiting period, but more than one-half of persons disabled for neoplasms (mostly cancer) die before becoming entitled to Medicare. The death rate for other reasons for disability was much lower, with diseases of the digestive system having the second highest rate, 16 percent. There is, of course, no Medicare program data on the use of health services during the waiting period. However, data from the 1972 Survey of Disabled and Nondisabled Adults shows a 90-percent higher probability of being hospitalized for persons entitled less than 2 years to social security disability benefits compared with persons entitled 2 or more years (Duchnok, 1981).

Data on use of Medicare services for 1976-80 were computed for the cohort of disabled persons becoming entitled to Medicare in 1976 (Table 10). Reimbursement per enrollee (adjusted), hospital days per 1,000 enrollees, and death rates did not vary greatly during the first 5 years of Medicare entitlement. Rates of reimbursement and hospital days peaked in the second or third year and declined somewhat thereafter. Mortality rates dropped during the first 4 years and then rose in the fifth year.

Conclusions

This study has shown that disabled Medicare enrollees are much higher users of health services and experience higher mortality than either their counterparts in the general population or than Medicare aged enrollees close to them in age. This is, of course, to be expected, but it is important to remember that the data reflect health care use and mortality occurring at least 29 months from the initial onset of disability (the 5-month waiting period from

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[6] Since Medicare coverage for the disabled began on July 1, 1973, the oldest formerly disabled enrollees would be 72 years on July 1, 1981.

Table 9

Number of workers receiving social security disability awards in 1975 and percent who died during the 2-year waiting period for Medicare entitlement, by reason for disability

Reason for disability	ICD-8 codes	Number of disability awards in 1975	Percent dying during 2-year waiting period for Medicare benefits
Total	—	564,380	11
Infective and parasitic diseases	000-136	7,780	4
Neoplasms	140-239	55,340	55
Endocrine, nutritional and metabolic diseases	240-279	22,380	7
Mental disorders	290-315	64,360	3
Diseases of the nervous system and sense organs	320-389	37,300	5
Diseases of the circulatory system	390-458	170,860	9
Diseases of the respiratory system	460-519	37,900	8
Diseases of the digestive system	520-577	16,580	16
Diseases of the genitourinary system	580-629	5,480	8
Diseases of the musculoskeletal system	710-738	105,360	2
Congenital anomalies	740-759	6,520	3
Accidents, poisonings, and violence	800-999	30,100	3
Other	—	4,420	8

[1] *Eighth Revision International Classification of Disease, Adapted for Use in the United States.*

SOURCE: Social Security Administration: Data from the Continuous Disability History File.

onset of disability to receipt of social security benefits plus the 24-month waiting period for Medicare). Additionally, rates of health care use and mortality remain basically the same in the first 5 years of entitlement to Medicare. Thus, the data show both a higher need for health care and also that this need apparently does not diminish much over time. Clearly, then, the basic intent of the Social Security Amendments of 1972—to extend coverage to a high need group—is being met.

This study also raises again some issues that were first debated before the passage of the Social Security Amendments of 1972 concerning the requirement of a 2-year waiting period before Medicare entitlement. The majority view of the Report of the Advisory Council on Health Insurance for the Disabled (1969) recommended only a 3-month waiting period between the date disability was determined to have begun and entitlement to Medicare because of the belief that health care needs are greatest at the onset of disability. (This is in contrast to the current 5-month waiting period for receipt of cash benefits after disability has begun plus the 2-year wait from receipt of cash benefits to Medicare entitlement.) The minority view of the Council recommended a 12-month waiting period to avoid duplication of Medicare with private coverage. In passing the 1972 Amendments, Congress recognized the need for Medicare coverage for the disabled but provided for a 2-year waiting period, " . . . to keep program costs within reasonable bounds, avoid overlapping private health insurance protection . . . " and to " . . . provide assurance that protection will be available to those whose disabilities have proven to be severe and long lasting." (United States Senate, 1972). The waiting period requirement has had a paradoxical effect. Health care use is higher in the first 2 years of entitlement to social security disability benefits than in subsequent years. Death rates are also highest in the waiting period, and some of the sickest disability beneficiaries do not survive the waiting period. In

Table 10

Number of enrollees, Medicare reimbursements per enrollee, short-stay hospital days per 1,000 enrollees, and mortality rates for disabled Medicare enrollees becoming entitled in 1976: 1976-80

Measure	Year				
	1976	1977	1978	1979	1980
Number of enrollees entitled on June 30 of year	11,742	23,397	22,104	21,061	19,780
Medicare reimbursement per enrollee[1]	$759	$767	$794	$730	$702
Hospital days per 1,000 enrollees	3,840	4,027	4,015	3,823	3,765
Number of deaths per 1,000 enrollees	40	38	36	34	38

[1] Adjusted by deflating by the increase in Medicare reimbursement per enrollee for all disabled persons.

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy, Data from the Medicare Statistical System.

particular, more than one-half of those beneficiaries entitled to social security disability because of cancer die before becoming entitled to Medicare. Thus, the waiting period reduces costs, but it does not provide Medicare coverage to disabled beneficiaries when their needs are greatest. Some beneficiaries are undoubtedly covered by private insurance either through their former employment or their spouse during all or part of the waiting period, but the current extent of such coverage is unknown. In 1972, 35 percent of social security disability beneficiaries surveyed who were entitled less than 2 years had no private health insurance (Duchnok, 1981).

Given the current mandate for cost control it seems unlikely that the 2-year waiting period would be eliminated without some other offsetting program change to decrease expenditures. One option could be for Medicare to become the secondary payer in the first few years of entitlement to cash disability benefits. This might offset the increased expenses of eliminating or reducing the waiting period for Medicare. A precedent for this has been established by the Tax Equity and Fiscal Responsibility Act of 1982 which made Medicare the secondary payer for persons 65-69 years age covered by group health insurance plans and for enrollees entitled because of ESRD for their first year on Medicare. Current data on the extent to which disability beneficiaries have health insurance protection during their first 2 years of entitlement would be needed to estimate the cost of such an option.

Related issues are raised by proposals to gradually raise the general age for Medicare entitlement from 65 years to 67 years of age in line with the Social Security Amendments of 1983 which gradually raise the age for social security benefits from 65 years to 67 years of age by the year 2027 (Advisory Council on Social Security, 1983). It can be anticipated that many persons 65 and 66 will retire on disability when the retirement age increases. Program data show that the number of disability awards increases with age, and that the largest number of disability awards for any age group are for persons 60-64 years of age (Lando, Farley, and Brown, 1982). If the waiting period provision were still in effect, disabled beneficiaries 66 and 67 years of age would have no Medicare entitlement. Additionally, disability retirees age 63 and 64 would no longer become entitled to Medicare when they reached age 65 but would have to wait a full 2 years for Medicare. Thus, as policymakers consider raising the Medicare entitlement age from 65 years to 67 years of age they will need to keep in mind that although the majority of persons in that age range are in good health, a segment of the population has failing health and may have difficulty remaining in the work force and retaining private health insurance coverage.

The ADC group emerges from this study as a population different in terms of use of Medicare benefits from the rest of Medicare disabled enrollees. They use less Medicare services probably because they are younger and are, to a large extent, disabled for mental (mainly mental retardation) rather than physical diseases. Despite their low use of Medicare services, their higher-than-average death rate suggests they are in poor health. There is new public concern that the mentally retarded not be "warehoused" in institutions that do not offer adequate care and services for developing as much independence as possible (Atkins, 1984). Under the Medicaid program, the States are using new authority to offer retarded persons community-based services rather than institutional care. As we develop better information and understanding about this population, the Federal Government and the States may be able to insure more cost-effective and beneficial services to this population.

This study represents the first step in increasing our knowledge of health care use by Medicare's disabled enrollees. Further research is planned to examine the relationship of reason for disability to use of Medicare services. It is hoped that a better understanding will lead to policy recommendations for changes to improve the efficiency of health care delivery and the health of this population.

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A profile of functionally impaired elderly persons living in the community

by Candace L. Macken

The Health Care Financing Administration, in cooperation with other agencies of the Department of Health and Human Services, conducted surveys in 1982 and 1984 designed to develop a better understanding of the number and circumstances of functionally impaired elderly persons living in the community. This report is based on data from the 1982 Long-Term Care Survey. There were approximately 5 million functionally impaired elderly persons living in the community in 1982. The data show that functionally impaired persons in the community are older, are more often female, have lower incomes, and have a larger proportion of black people than the general elderly population. The data also provide baseline information on what functional impairments are prevalent among them, what means they use to cope with the limitations, and from whom they receive help. The baseline data gathered in 1982 will be supplemented by longitudinal data gathered in the 1984 Long-Term Care Survey.

Introduction

National data that provide a profile of functionally impaired aged persons living in the community are presented in this article. The data include demographic and socioeconomic characteristics of these persons and their functional capabilities.

The data were obtained during the 1982 Long-Term Care (LTC) Survey that was cosponsored by the Health Care Financing Administration (HCFA) and the Office of the Assistant Secretary for Planning and Evaluation, Department of Health and Human Services. The 1982 LTC Survey was the first of a coordinated pair of surveys designed to improve our understanding of the dynamics of the institutionalization of elderly persons. A second LTC Survey was conducted in 1984 that was cosponsored by HCFA and the National Center for Health Services Research and Health Care Technology Assessment. This survey followed up on the 1982 sample and expanded the scope of the survey of aged persons to include those in nursing homes. This is the first time that such a longitudinal tracking of aged persons from community to nursing homes has been conducted. The findings of the two surveys will permit analyses of the factors that differentiate functionally impaired aged persons living in the community from those with similar impairments living in nursing homes. Findings from the 1982 Survey are presented in this article.

The support of these surveys by constituent agencies of the Department of Health and Human Services reflects concern about the long-range effects on public expenditures of providing for the long-term care needs of the aged. The growth in the numbers of the aged, their increasing longevity, and the accompanying rise in the number of persons with impairments in their ability to carry out the normal activities of everyday life will have significant impact on the social and financial resources required to meet their physical and social needs.

The impact on these trends is already apparent. The costs of long-term care are such that if aged persons begin institutional residence financially able to pay for their own care, the probability of early exhaustion of financial resources is substantial. Increasingly, recourse to public programs becomes necessary. Medicaid has become the primary public program that pays for the long-term care of the indigent aged, including persons who become indigent trying to meet the costs of long-term care. Thus, many Medicaid beneficiaries were formerly part of the middle class. In 1970, $1.1 billion, or 59 percent of total Medicaid expenditures for the aged, was paid to nursing homes[1] (Fisher, 1980). By 1984, $10.4 billion, or 68 percent of the Medicaid budget for the elderly, was spent for institutional care (Waldo and Lazenby, 1984).

Approximately 95 percent of the aged are covered by Medicare. Medicare pays for most of the expenses incurred by the aged for acute hospital and physician services. Although Medicare pays for up to 100 days of care in a skilled nursing facility during a spell of illness, it does not pay for care in a nursing home when skilled nursing care, as defined in regulations, is no longer required. If continued stay in a nursing home is required for intermediate levels of care, the costs must be borne by the patient. When patients are indigent and are unable to pay for their care, the patient may qualify for coverage under Medicaid. Medicaid covers costs for as long as the care is needed. It is for this reason that nursing home expenditures are so large a part of the Medicaid program.

A factor in the rising expenditures for long-term care has been the changing age composition of the American population. The rising proportion of persons 65 years of age or over is well known. Of greater significance, in terms of its implications for long-term care needs and expenditures, has been the rapid rate of increase in the numbers of persons 85 years of age or over, the population segment most

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[1] Nursing homes include intermediate care facilities, intermediate care facilities for the mentally retarded, and skilled nursing facilities.

immediately faced by the need for long-term care services from others.

The age trends are striking. In 1970, 20 million Americans were 65 years of age or over. By 1980, this number had increased almost 28 percent to 25.5 million, and the number of persons in the national population had risen about 12 percent. During the period that the number of persons 65 years of age or over increased by 28 percent (1970-1980), Medicare enrollees 85 years of age or over increased more than 60 percent, from 1.5 million to slightly more than 2.4 million. Also, the number of Medicare enrollees 85 years of age or over increased faster than the number for any other age group, including the age group 30-34 years. The latter group, which in 1980 represented the cohort born at the peak of the post-war baby boom, increased by 54 percent during this period.

Similar trends are apparent from institutional statistics. It was found during the 1970 census that 796,000 persons 65 years of age or over were in institutions (U.S. Bureau of the Census, 1973). By the 1980 census, the number of institutionalized persons 65 years of age or over had increased to 1.2 million (U.S. Bureau of the Census, 1984a). During this period, the number of persons 85 years of age or over in nursing homes increased from 249,000 in 1970 to almost 488,000 in 1980. Persons 85 years of age or over accounted for about 60 percent of the increase in the aged nursing home population during the 10-year period.

Population projections estimate that by 1990 the number of persons 85 years of age or over will rise to 3.5 million. By 2025, when the youngest baby boom cohort will be 65, the number of persons 85 years of age or over is expected to be about 7.7 million. These population projections have already affected the planning of social policies. One notable example is the provision of the Social Security Amendments of 1983 that increased the base age for retirement under social security to 67 years as of the year 2022. A key consideration in the raising of the base age was the increased longevity of Americans and the years of retirement. If the present relationship between use, expenditures, and population trends remain unchanged, the cost of nursing home services can be expected to become an increasingly burdensome expenditure for Federal, State, or local governments. This has generated major efforts to explore alternatives to providing long-term care in an institutional setting. One that has begun to be explored is the maintenance of individuals in need of long-term care in the community for as long as possible.

The interest in the functionally impaired living in the community is because they comprise a cohort from which new nursing home residents are likely to come. Therefore, to the extent that our understanding of the factors that promote the continued stay of these persons in the community can improve, the more likely it is that appropriate social policies could be initiated to support that goal.

Three benefits are readily apparent from helping aging persons remain in the community as long as possible. First, remaining in the community has the positive social and psychological effects of encouraging a maximum amount of independence despite functional limitations. Second, up to a certain point, community living is generally a less expensive alternative to institutionalization. Not only does it allow individuals to support themselves using personal resources longer, it also delays the need for use of public funds for support. Eventually, however, the point may be reached where the services required to support continued maintenance in the community (e.g., day care, meals on wheels, home nursing services) necessitate consideration of nursing home placement as a lower-cost alternative for the family, because many of the services are not covered by public programs. However, until this point is reached, the need to resort to nursing home services paid for by public programs can be deferred. Third, the reduced need for institutionalization could also contain the payments for capital expenditures made by the Government for the construction of nursing homes through the inclusion of depreciation in the costs of services.

It is expected that the findings from the 1982 and 1984 Surveys will provide enriched insights into the process that leads to nursing home placement and the factors that prevent premature placements and support continued stay in the community. A number of factors influence the ability of an individual to stay in a community setting. Marital status and living arrangements have been thought to be strong indicators of the feasibility of maintaining a functionally impaired person in the community; each represents the potential stock of informal caregivers that can perform personal care or basic chore services. Functional capability and the need for personal services may be the prime indicators of whether an individual can be maintained in the home. Another indicator, income, represents a measure of an individual's or family's ability to pay for formal services or for adaptations of features in the home. The 1982 Survey was the first effort focused on ascertaining the size and characteristics of this group, and these indicators for the 1982 sample are described in this article.

There have been earlier studies dedicated to learning about which of these factors bear the strongest relation to the ability of an individual with functional impairments to remain in the community. One of the stumbling blocks in these efforts has been the lack of nationally representative data collected at the level of detail necessary to make statistically reliable analyses on individuals with functional impairments. Nationally based studies such as the National Health Interview Survey of the National Center for Health Statistics or the Survey of Income and Program Participation of the U.S. Bureau of the Census do not focus on the functionally impaired elderly in particular. As a result, the subset of functionally limited elderly found during the conduct of these surveys is not large enough to carry out detailed analyses. Although State-specific studies do not preclude the provision of indicators of what characteristics seem to be instrumental in allowing functionally impaired persons to remain in the community, they are not broad-based enough to make decisions affecting the entire population 65 years of age or over.

Source of data

The 1982 LTC Survey was designed to produce a data base that would overcome the limitations mentioned earlier. Its target population was the functionally impaired aged living in the community; its sampling frame was a national list of Medicare enrollees.

The 1982 LTC Survey was conducted by the U.S. Bureau of the Census, under the cosponsorship of the Health Care Financing Administration and the Office of the Assistant Secretary for Planning and Evaluation, between June and October of that year. Because there was no existing sample frame that readily identified the functionally impaired aged living in the community, a sample of persons drawn from the Medicare enrollment files was screened by telephone to determine whether any had problems performing any of a set of activities of daily living (ADL's) or of instrumental activities of daily living (IADL's) for a period of at least 3 months. The set of activities incorporated into these scales produce a valid and reliable assessment of a person's overall functional capacity. The ADL's are a series of activities that are vital to independent personal functioning. They include activities such as eating, dressing, and bathing. The IADL's are a series of activities that represent the ability to live alone. They include activities such as doing housework, preparing meals, and grocery shopping among others. Partial or complete inability to carry out any of these activities without the use of special equipment or personal assistance was defined as a functional impairment.

The LTC sample of persons selected from the Medicare files covered all 50 States and the District of Columbia. Proportional representation of the groups of interest was achieved by stratifying the sample according to characteristics such as census geographic region, age, race, and original reason for Medicare entitlement. The resulting screening sample consisted of about 36,000 persons.

This large screening sample was chosen initially because 6,000 detailed interviews were desired and the exact rate at which persons would qualify for the detailed interview was unknown. This was primarily because the LTC definition of impairment was not identical to that used in previous surveys.

Methods and procedures

Each person in the screening sample was contacted by telephone to determine whether he or she had problems or expected to have problems performing any of a set of activities known as the activities of daily living (ADL's) or any of another set of activities known as the instrumental activities of daily living (IADL's) for a period of at least 3 months. Persons who had long-term problems performing the ADL's or IADL's were scheduled for the second phase of the LTC Survey. Persons without problems were not contacted again. Persons found to be in institutions in either phase of the 1982 Survey were not contacted again.

Approximately 6,400 of the 36,000 persons originally screened were determined to have long-term problems with at least one of the ADL's or the IADL's and were interviewed by a personal visit in the second phase of the Survey. There were two data gathering instruments for the second phase: a control card requiring information on housing characteristics, on household composition, on the children of the sample person not living in the household, and on paid and unpaid persons ("helpers") who provided care to the sample person; and a detailed questionnaire, requiring information on the extent to which the sample person had problems performing the ADL's and IADL's, on the type of care provided by the helpers, on medical expenses, on income, and on other aspects that would affect the sample person's ability to remain in the noninstitutionalized community. A section of the detailed questionnaire consisted of a battery of 10 questions constituting the Short Portable Mental Status Questionnaire. This section was designed to measure the respondent's cognitive functioning. Where the respondent was a proxy, the mental status questionnaire was not administered. Approximately 26 percent of the interviews were conducted with proxies. Reasons necessitating the administration of the questionnaire to proxies were as follows:

- Sample persons were absent at time of interview.
- They were physically or mentally unable to participate in interview.
- They had difficulty with the English language.
- They had speech or hearing problems. A person could be accepted as a proxy for the sample person if the respondent was 15 years of age or over and was knowledgeable about the sample person's health care needs.[2]

Summary of tables

The data in the tables are essentially descriptive and are intended to convey an overview of the physical and cognitive limitations of functionally impaired persons living in the community and of the source of assistance that support continued community residence. Data have been rounded to the nearest percentage point when discussed in the text. A list of the tables and their contents follow:

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[2] The technical note pertaining to the 1982 LTC Survey provides additional details about the sampling and estimation procedures used, including reliability of estimates tables. It is available from the author on request.

- Table 1. The number and percent distribution of aged Medicare enrollees with ADL and/or IADL functional limitations.
- Table 2. The percent distribution of functionally impaired elderly by specified numbers of ADL limitations.
- Table 3. The percent distribution of functionally impaired elderly with specific types of ADL limitations.
- Table 4. The percent distribution of functionally impaired elderly with continence problems.
- Table 5. The percent distribution of functionally impaired elderly persons by specified numbers of IADL limitations.
- Table 6. The percent of functionally impaired elderly persons with specific types of IADL limitations.
- Table 7. The percent distribution of functionally impaired elderly persons by level of cognitive impairment.
- Table 8. The percent distribution of functionally impaired elderly persons by marital status.
- Table 9. The percent distribution of functionally impaired elderly persons by living arrangement.
- Table 10. The percent distribution of functionally impaired elderly persons by type of living quarters occupied.
- Table 11. The percent of functionally impaired elderly persons by special features in the homes that could aid ADL functioning.
- Table 12. The percent of functionally impaired elderly persons without such features in the home by special features identified as being potentially useful.
- Table 13. The percent distribution of functionally impaired elderly persons by family income.

Demographic characteristics

Data on age, race, and sex of the functionally impaired aged living in the community are presented in Table 1. In order to collect data on race, survey respondents were asked to classify themselves into one of five racial categories: white; black; Asian or Pacific islander; American Indian, Eskimo, Aleut; or other. The latter four groups are included under the all other category in Table 1. This was done to permit comparability with race data taken from the Medicare enrollment files. In subsequent tables, race data are shown only for white and black persons. The sample for the other race categories was too small to permit separate estimates.

The first two columns of Table 1 refer to 1982 mid-period Medicare enrollment; the next three columns refer to 1982 LTC Survey data for functionally impaired aged Medicare enrollees. The fifth column shows functionally impaired elderly persons as a percent of the Medicare enrollment in the particular demographic category.

During the 1982 Survey, it was determined that there were about 5 million functionally impaired Medicare enrollees living in the community, about 19 percent of the total Medicare enrollment. This proportion is similar to that found by Nagi (1976). Nagi found that 17 percent of aged persons needed assistance in independent living or personal care. This small difference may reflect either the different years in which the two studies were conducted or sampling variation. Nagi's study focused on persons 18 years of age or over, and a detailed analysis of the characteristics of the aged was not carried out.

The criterion used during the 1982 Survey to define the existence of a functional limitation appears to account for the difference of this finding from that found in some other surveys. In the National Health Interview Survey (NHIS), for example, the percent of functionally limited aged persons living in the community was about 9 percent (Feller, 1983). One of the main factors contributing to this difference is that the LTC Survey screened for problems that lasted or were expected to last at least 3 months before or after the date of the interview, but the NHIS screened for problems that existed at least 3 months prior to the week of interview. If a person's problems lasted less than 3 months prior to the week of interview, even though they were expected to last 3 months altogether, the person was excluded from the NHIS count of functionally impaired persons.

During the 1982 Survey, it was found that the percent of persons who were functionally impaired increased at each age interval-rising to 35 percent of persons 85 years of age or over. As can be derived from Table 1, the median age of the functionally impaired was 77 years compared with 73 years for all Medicare enrollees. A greater proportion of persons who were not white than of those who were, were functionally impaired at each age interval. The median age of functionally impaired white persons was 77 years compared with 75 years for all other races. Overall, 29 percent of persons who were of other races were functionally impaired compared with 19 percent of white persons. Among persons living in the community, functional impairments appeared more widespread among elderly persons of all races other than white.

The rates of impairment among white females were slightly higher than those for white males across all age categories. Overall, the rate for aged white females was 21 percent compared with 17 percent for white males. Among other races, the difference in the rate for impairment between females and males was wider than that for white males and females, with 33 percent of females and 24 percent of males of other races reporting impairments.[3]

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[3] The tables in this article do not show age-sex or age-race breakdowns, although such breakdowns are sometimes referred to in the text when they are deemed noteworthy. In fact, large differences by race and sex are not usually seen as often as differences by age. Differences by age-sex or age-race exhibit trends similar to those by age of the total population. Tables showing age-sex and age-race are available on request from the author.

Table 1

Number and percent distribution of Medicare enrollees and of functionally impaired elderly persons, with functionally impaired persons as a percent of the Medicare population, by age, sex, and race: 1982

	Total Medicare enrollment as of July 1, 1982		Persons with functional impairments		
Age, sex, and race	Number in thousands	Percent distribution	Number in thousands	Percent distribution	As a percent of Medicare population
Total	26,539.9	100.0	5,073.9	100.0	19.1
Age					
65-69 years	8,652.1	32.6	1,108.5	21.8	12.8
70-74 years	7,021.6	26.5	1,108.2	21.8	15.8
75-79 years	5,063.9	19.1	1,066.0	21.0	21.1
80-84 years	3,184.9	12.0	885.5	17.5	27.8
85 years or over	2,617.4	9.9	905.7	17.9	34.5
Sex					
Male	10,652.6	40.1	1,822.5	35.9	17.1
Female	15,887.4	59.9	3,251.5	64.1	20.6
Race					
White	[1]23,396.5	[2]88.2	4,377.9	86.3	18.7
All other[1]	2,371.5	[2]8.9	696.1	13.7	28.5

[1] Persons of unknown race are not included.

[2] Based on total Medicare enrollment which includes persons of unknown race.

The increase in the proportion of functionally impaired persons at the upper limit of the age scale, shown in Table 1, highlights the problem presented by the growing proportion of persons 85 years of age or over. Recent U.S. Bureau of the Census (1982) estimates show that about 1.1 percent of the total U.S. population is 85 years of age or over and that the percent is expected to rise to about 5.2 percent by 2050. Because persons in this age category currently represent the group with the largest proportion of persons with functional impairments, and the total number of persons in this age group is expected to increase, it can then be expected that the number of aged persons with functional impairments will increase in absolute terms over time.

Functional limitations

Data on the number of functional limitations among aged persons living in the community who reported any limitation of at least 3-months duration are shown in Tables 2-4. Persons were asked about the degree to which any of the activities of daily living (ADL's) could be performed. The ADL's are comprised of the following:

- Bathing.
- Dressing.
- Getting to the bathroom or using the toilet.
- Getting in or out of bed.
- Getting around outside.
- Eating.
- Continence.

The questions were designed to cover the continuum from total independence in performing an activity (i.e., needing no assistance to perform an activity) to total dependence (i.e., not being able to perform the activity at all).

Among the 5 million aged persons living in the community who reported a limitation in ADL's or instrumental activities of daily living (IADL's) about one-third reported no ADL limitation (Table 2). The absence of a limitation in ADL's decreased with age and the existence of multiple limitations increased with age. This pattern was more pronounced at the younger ages among females than among males. Only about 36 percent of the females had no ADL limitations at 65-69 years of age, and about 44 percent of the males had no ADL limitations at 65-69 years of age. The differences narrow as females and males grow older, however. For persons 85 years of age or over, 21 percent of the females and 25 percent of the males had no problems. The data point to the greater need for assistance by females and the greater likelihood of females being institutionalized. This is reflected in the sex distribution among institutionalized persons, of which about 70 percent were females. Among institutionalized persons 65 years of age or over, 73 percent were females (U.S. Bureau of the Census, 1984a). This sex difference will be discussed again in relation to the marital status and living arrangements of elderly females.

The degree of dependency in each of the ADL's by age, race, and sex is shown in Tables 3 and 4. As shown in earlier studies by Katz and Akpom (1976), loss of independence is likely to occur most often in bathing and least often in eating. The findings of the 1982 LTC Survey are consistent with this finding, 42 and 6 percent, respectively.

Except for dressing and eating, a smaller proportion of aged males than of aged females in the community reported functional limitations in ADL's. Although the reason for this difference is unclear, it may be related to the fact that a lower proportion of males than of females in these age groups are without spouses because of the greater longevity of females. As shown in Table 8, approximately 73 percent of the functionally impaired males living in the community were married as opposed to about 28 percent of the functionally impaired females. The data in Table 9, which will be discussed later in more detail, lends further support to this supposition. It is shown that 40 percent of the functionally impaired females lived alone and only 14 percent of the functionally impaired males lived alone. Thus, a functional limitation may not be as apparent to males whose spouses are available to provide needed support. Widowed females, however, may be more aware of a functional limitation because of the extra effort involved in obtaining care from someone outside their own household.

The most noteworthy finding with respect to ADL limitations appears to be the reliance on the use of special equipment. The use of special equipment, with or without personal help, ranged from 1 percent of those functionally limited in feeding themselves to about 36 percent of those who could not get around the house without some assistance. For four of the ADL's—getting in or out of bed, getting around inside, bathing, and getting to the bathroom or using the toilet—the use of special equipment only (i.e. without personal assistance) in the performance of these activities was the most frequent form of assistance used. This is the first time that the data highlight the importance of access to and use of special equipment by functionally impaired persons to facilitate continued stay in the community. With the exception of bathing and getting to the bathroom or using the toilet, a combination of special equipment and personal help was the next most frequent form of assistance used. For eating and dressing, the most frequent form of assistance used was personal help only. The use of special equipment may be underestimated for eating and dressing, however, because what was defined as special equipment may not have been perceived as such by the respondents. For example, the use of a partitioned dinner plate or the use of snap fasteners or velcro strips on clothing may not have been reported because the wide commercial availability of these items in retail outlets may decrease the perception of these as being special equipment. A wheelchair, on the other hand, is more likely to be considered special equipment because its need is often associated with a severe degree of limitation in mobility, and it is usually acquired in specialized retail outlets.

Data on the number of IADL limitations reported are presented in Table 5. The IADL's are those activities in the home and community that enable a person to live alone. They include the following:

- Heavy housework.
- Light housework.
- Laundry.
- Preparing meals.
- Shopping for groceries.
- Getting around outside.
- Going places outside of walking distance.
- Managing money.
- Making telephone calls.
- Taking one's own medicine.

In designing the conceptual framework for these items, an effort was made to remove role or lifestyle implications from this series. For example, if individuals responded that they did not usually perform an activity, they were then asked if they could do it if they had to. Thus, the possible bias in response caused by males who said that they did not do housework because their wives perform this function was, in theory, reduced. Similarly, the

Table 2

Percent distribution of functionally impaired elderly persons reporting limitations in activities of daily living, by number of limitations, age, sex, and race: 1982

Age, sex, and race	Total persons	Number of limitations reported 0	1	2	3	4	5	6	7
				Percent distribution					
Total	100.0	33.3	22.7	14.9	9.8	7.4	6.0	3.8	2.1
Age									
65-69 years	100.0	39.2	22.6	13.5	8.2	7.0	5.1	2.5	1.8
70-74 years	100.0	37.6	23.4	13.5	7.9	6.3	6.4	3.7	1.2
75-79 years	100.0	34.3	23.1	13.5	10.3	7.1	5.7	4.2	1.8
80-84 years	100.0	30.4	22.5	16.8	9.9	7.3	6.1	4.5	2.5
85 years or over	100.0	22.1	21.6	18.3	13.4	9.5	7.1	4.4	3.5
Sex									
Male	100.0	37.5	22.9	11.9	8.4	7.4	6.4	3.6	1.9
Female	100.0	30.9	22.6	16.7	10.6	7.4	5.8	3.9	2.2
Race									
White	100.0	33.0	23.3	14.7	10.2	7.1	6.1	3.8	1.9
Black	100.0	35.2	18.2	16.9	7.4	9.4	5.6	3.6	3.8

possible response bias would be reduced for females who said that they did not manage their own money because their husbands or children did.

Unlike ADL limitations, where only one-third of the persons with functional limitations reported one or more ADL problems, about 90 percent reported having at least one IADL limitation. Males reported having no IADL limitations (13 percent) more often than females (9 percent). This more closely reflected the pattern among white persons but not among black persons. For both races, however, a smaller percent of males than of females reported three to seven IADL limitations. Again, this pattern may be attributable to the fact that there are fewer aged widowed males than females. Males may be underreporting IADL limitations because a spouse is available to provide support. Males with eight or more IADL limitations may be remaining in the community because their spouses are available to provide support.

Data on the type of IADL limitations found among the elderly living in the community are shown in Table 6. In decreasing frequency, doing heavy work like moving furniture or washing walls, shopping for groceries, going places outside walking distance, and doing laundry were the most commonly reported problems; all were reported by at least 40 percent of those surveyed. Doing laundry, doing light work like dusting and straightening up, and preparing meals were reported as problems more often for males than for females. This is likely to be a result of a role bias for men who do not usually perform such tasks. Similarly, shopping for groceries and going places outside of walking distance were reported as problems more often for females than for males, which may be because females in these age groups frequently do not drive. The IADL's were reported as problems at very much the same rates for black persons and for white persons. Black females reported managing money, taking medicine, and making telephone calls as problems more often than white females, however.

Table 3

Percent distribution of functionally impaired elderly persons reporting limitations in activities of daily living, by type of activity, degree of limitation, age, sex, and race: 1982

		Degree of limitation				
Activity, age, sex, and race	Total persons	No assistance	Special equipment only	Personal help only	Special equipment and personal help	Completely dependent
			Percent distribution			
Bathing						
Total	100.0	57.9	14.3	13.7	8.4	5.7
Age:						
65-69 years	100.0	66.4	12.2	11.0	6.4	4.0
70-74 years	100.0	62.4	13.7	11.6	7.8	4.5
75-79 years	100.0	58.5	14.5	12.6	7.8	6.5
80-84 years	100.0	52.4	16.7	15.1	9.5	6.3
85 years or over	100.0	46.8	15.0	19.4	11.0	7.8
Sex:						
Male	100.0	62.1	10.5	13.7	9.6	4.1
Female	100.0	55.6	16.4	13.7	7.6	6.6
Race:						
White	100.0	57.0	15.2	13.1	8.7	6.0
Black	100.0	64.2	8.1	17.7	6.1	3.9
Dressing						
Total	100.0	80.5	1.3	15.2	1.0	2.1
Age:						
65-69 years	100.0	80.8	1.4	15.2	1.0	1.5
70-74 years	100.0	82.3	1.2	13.3	1.0	2.3
75-79 years	100.0	79.9	2.0	15.4	(1)	1.9
80-84 years	100.0	80.8	1.3	15.3	1.0	1.5
85 years or over	100.0	78.1	(1)	16.9	1.2	3.2
Sex:						
Male	100.0	78.0	(1)	18.0	1.0	2.2
Female	100.0	81.9	1.6	13.6	1.0	2.0
Race:						
White	100.0	81.0	1.3	14.7	1.0	2.0
Black	100.0	77.2	1.0	18.3	(1)	2.7

See footnote at end of table.

Table 3—Continued

Percent distribution of functionally impaired elderly persons reporting limitations in activities of daily living, by type of activity, degree of limitation, age, sex, and race: 1982

Activity, age, sex, and race	Total persons	Degree of limitation				
		No assistance	Special equipment only	Personal help only	Special equipment and personal help	Completely dependent
		Percent distribution				
Getting to the bathroom or using toilet						
Total	100.0	79.1	10.1	4.1	4.5	2.1
Age:						
65-69 years	100.0	84.2	6.1	4.2	3.7	1.7
70-74 years	100.0	81.6	9.3	3.8	3.8	1.5
75-79 years	100.0	80.3	9.7	3.2	4.7	2.2
80-84 years	100.0	77.4	11.2	4.7	4.7	2.0
85 years or over	100.0	70.2	15.6	4.9	5.7	3.5
Sex:						
Male	100.0	85.4	7.2	(1)	4.1	2.4
Female	100.0	77.3	11.9	4.1	4.7	2.0
Race:						
White	100.0	79.1	10.5	4.0	4.5	2.0
Black	100.0	79.5	7.8	5.3	4.3	3.1
Getting in or out of bed						
Total	100.0	74.0	13.5	4.6	7.0	(1)
Age:						
65-69 years	100.0	76.2	11.2	5.2	6.6	(1)
70-74 years	100.0	76.2	13.2	4.2	6.1	(1)
75-79 years	100.0	74.5	12.9	4.5	7.3	(1)
80-84 years	100.0	73.6	14.8	3.9	7.1	(1)
85 years or over	100.0	68.5	16.3	5.3	8.2	1.7
Sex:						
Male	100.0	75.3	18.2	4.2	7.1	(1)
Female	100.0	73.3	14.1	4.9	7.0	(1)
Race:						
White	100.0	73.8	13.4	4.4	6.9	(1)
Black	100.0	72.2	14.1	5.5	7.6	(1)
Getting around inside						
Total	100.0	59.9	28.1	3.1	8.2	(1)
Age:						
65-69 years	100.0	67.6	21.8	3.2	7.0	(1)
70-74 years	100.0	64.5	25.1	2.5	7.4	(1)
75-79 years	100.0	61.0	27.6	3.0	7.9	(1)
80-84 years	100.0	56.0	31.5	3.0	8.4	1.1
85 years or over	100.0	47.5	37.1	3.7	10.9	(1)

See footnote at end of table.

Table 3—Continued

Percent distribution of functionally impaired elderly persons reporting limitations in activities of daily living, by type of activity, degree of limitation, age, sex, and race: 1982

Activity, age, sex, and race	Total persons	Degree of limitation: No assistance	Special equipment only	Personal help only	Special equipment and personal help	Completely dependent
	Percent distribution					
Getting around inside						
Sex:						
Male	100.0	61.4	27.7	2.3	7.8	(1)
Female	100.0	59.1	28.4	3.5	8.4	(1)
Race:						
White	100.0	60.5	27.7	2.9	8.3	(1)
Black	100.0	55.9	30.8	4.0	7.9	1.3
Eating						
Total	100.0	94.0	(1)	4.5	(1)	(1)
Age:						
65-69 years	100.0	94.1	(1)	4.4	(1)	(1)
70-74 years	100.0	95.7	(1)	2.9	(1)	(1)
75-79 years	100.0	94.7	(1)	4.4	(1)	(1)
80-84 years	100.0	93.9	(1)	4.9	(1)	0.0
85 years or over	100.0	91.1	(1)	6.5	1.2	(1)
Sex:						
Male	100.0	93.0	(1)	5.3	(1)	(1)
Female	100.0	94.5	(1)	4.1	(1)	(1)
Race:						
White	100.0	94.2	(1)	4.3	(1)	(1)
Black	100.0	92.6	(1)	6.3	(1)	(1)

[1] Less than 1 percent.

Table 4

Percent distribution of functionally impaired elderly persons reporting continence problems as an activities of daily living limitation, by age, sex, and race: 1982

Age, sex, and race	Total persons	Continence problems	None
	Percent distribution		
Total	100.0	24.2	75.8
Age			
65-69 years	100.0	23.5	76.6
70-74 years	100.0	23.8	76.2
75-79 years	100.0	24.4	75.6
80-84 years	100.0	23.8	76.3
85 years or over	100.0	25.9	74.1
Sex			
Male	100.0	20.7	79.3
Female	100.0	26.2	73.8
Race			
White	100.0	23.6	76.4
Black	100.0	28.7	71.3

Impairment of cognitive functioning

Another important indicator of whether individuals can function in the community is the degree of cognitive functioning they possess. Cognitive functioning refers to individuals' awareness of time and place, including personal information like age and date of birth, awareness of events outside their own area of personal interaction both currently and in the recent past, and ability to maintain a reasonable attention span. The degree of cognitive functioning shown in Table 7 was measured by asking sample persons a battery of 10 questions known as the Short Portable Mental Status Questionnaire. The degree of impairment was rated in the following manner:

- No impairment was perceived if the respondent answered the questions with only one or no errors.
- Minor impairment indicates that between two and four questions were answered incorrectly.
- Moderate impairment indicates that between five and seven questions were answered incorrectly.
- Severe impairment indicates that eight or more questions were answered incorrectly.

Table 5

Percent distribution of functionally impaired elderly persons reporting limitations in instrumental activities of daily living, by number of limitations, age, sex, and race: 1982

Age, sex, and race	Total persons	Number of limitations reported 0	1	2	3	4	5	6	7	8	9	10
						Percent distribution						
Total	100.0	10.5	12.9	12.2	12.3	12.0	9.2	6.7	7.2	7.1	6.5	3.5
Age												
65-69 years	100.0	16.9	18.5	14.1	11.3	8.9	7.7	5.0	4.9	6.0	4.1	2.6
70-74 years	100.0	13.5	15.6	13.6	13.2	11.8	8.1	6.3	6.0	5.5	3.8	2.6
75-79 years	100.0	9.5	13.3	13.5	12.6	12.7	9.1	6.8	7.1	5.9	5.9	3.6
80-84 years	100.0	6.6	10.5	12.1	13.4	13.0	9.6	6.8	8.4	8.2	7.1	4.2
85 years or over	100.0	3.9	4.6	6.8	11.1	14.0	12.3	8.5	10.5	10.5	12.9	4.9
Sex												
Male	100.0	13.3	14.2	12.4	9.3	8.5	8.0	6.5	7.2	9.2	7.3	4.2
Female	100.0	8.9	12.2	12.1	14.0	13.9	9.9	6.7	7.3	5.9	6.1	3.1
Race												
White	100.0	10.8	13.1	12.1	12.6	12.5	9.1	6.6	6.8	6.9	6.3	3.3
Black	100.0	8.7	11.6	12.9	10.2	7.9	10.3	6.4	10.2	8.3	8.4	5.3

If the interview was conducted with a proxy, these items were skipped. As noted earlier, proxies accounted for about 26 percent of the interviews. Thus, no clear inferences can be drawn on the probable distribution of sources if the mental status questionnaire were administered to all sample persons.

At all age intervals, except for the interval 85 years of age or over, more than one-half of all persons had no impairment of cognitive functioning. The percent with no cognitive impairment decreased with age, from 68 percent at 65-69 years of age to 47 percent among those 85 years of age or over. The percent of functionally impaired persons with moderate and severe cognitive impairment increased notably after 75 years of age. The data appear to suggest that retention of cognitive functioning enables better coping with functional limitations. The combined effects of decreased cognitive functioning and increased functional limitations, both of which generally increase with age, increase dependency and the likelihood of nursing home placement.

Males and females in the community showed similar patterns of cognitive functioning. There were notable differences by race in the pattern of impairment in cognitive functioning in the community. For white persons, 62 percent of the sample persons had no cognitive impairment and 32 percent had minor problems. For black persons, only 38 percent of the sample persons had no cognitive functioning problems and 46 percent had minor problems. Moderate cognitive impairment was present for about 5 percent of white persons and 14 percent of black persons. This difference may be attributable to several factors. As was shown earlier, black persons reported ADL and IADL problems more often than white persons, so differences in cognitive functioning may be related to poorer health. Differences in educational attainment may also be partly responsible for the difference in cognitive functioning. Data not presented separately show that for black persons 65-69 years of age the distribution of cognitive functioning problems is similar to that of white persons, and this may reflect increased educational attainment for persons at the lower age intervals. It may be that a further narrowing of such differences will occur as younger cohorts of black persons age.

Socioeconomic characteristics

This section presents data on the socioeconomic characteristics of functionally disabled persons in the community. Factors such as marital status, type of living arrangement, type of living quarters, and income may provide an environment that is conducive to allowing a functionally impaired individual to remain in the community.

Table 6

Percent of functionally impaired elderly persons reporting limitations in instrumental activities of daily living, by type of limitation, age, sex, and race: 1982

Age, sex, and race	Type of limitation reported								
	Heavy work	Light work	Laundry	Preparing meals	Shopping for groceries	Getting around outside	Going places outside walking distance	Managing money	Taking medicine
					Percent				
Total	73.9	22.9	40.7	30.1	57.3	8.9	46.5	25.7	23.6
Age									
65-69 years	70.0	19.3	32.3	22.9	44.9	6.3	36.5	17.6	18.0
70-74 years	72.6	20.2	36.4	24.5	50.0	8.5	40.1	18.9	18.9
75-79 years	73.6	21.9	38.3	28.8	57.0	7.6	47.3	24.6	23.3
80-84 years	74.3	23.7	44.8	32.8	62.1	10.1	53.4	30.5	26.4
85 years or over	80.3	31.3	55.2	44.7	77.1	13.2	59.0	40.6	33.9
Sex									
Male	71.7	29.3	43.8	36.0	50.7	6.8	36.8	26.7	28.4
Female	75.1	19.4	39.0	26.8	61.1	10.2	51.9	25.2	20.9
Race									
White	74.7	22.8	40.4	29.7	57.8	9.0	46.8	25.2	23.2
Black	76.6	26.6	47.6	36.4	60.3	10.1	49.0	32.6	29.2

Table 7

Percent distribution of functionally impaired elderly persons reporting impairment in cognitive functioning, by degree of impairment, age, sex, and race: 1982

Age, sex, and race	Total persons[1]	None	Minor	Moderate	Severe
	Percent distribution				
Total	100.0	58.6	34.3	6.3	(2)
Age					
65-69 years	100.0	67.7	29.2	3.0	(2)
70-74 years	100.0	61.7	34.2	3.4	(2)
75-79 years	100.0	57.1	35.1	6.8	1.0
80-84 years	100.0	51.7	38.6	9.0	(2)
85 years or over	100.0	47.4	36.9	13.5	2.2
Sex					
Male	100.0	61.5	31.5	6.3	(2)
Female	100.0	57.1	35.7	6.3	(2)
Race					
White	100.0	61.5	32.5	5.3	(2)
Black	100.0	38.3	46.3	13.6	1.8

[1] Total does not include responses by proxies.

[2] Less than 1 percent.

Marital status

Data on the marital status of functionally impaired elderly persons in the community are presented in Table 8. Persons classified as not married were either widowed, divorced, separated, or never married on the date of interview. The percent of married persons decreased at each age interval. The decrease was steady over the first four intervals, and then it dropped sharply to 20 percent for persons 85 years of age or over. The largest and most notable change over all age intervals was for females. More than one-half were not married by 65-69 years of age, and slightly more than 92 percent were not married by 85 years of age or over. In contrast, only about 19 percent of males were not married by 65-69 years of age, and almost one-half were still married by 85 years of age or over. By race, the percent of married persons was greater for white persons than for black persons at all age intervals except 85 years of age or over, where the percent was greater for black persons.

Marital status may be an important determinant of whether a functionally impaired person may be maintained in the community. As noted, more males had spouses at each age interval than did females. The fact that a spouse is available for support may contribute to the lower prevalence of ADL problems reported by men (Table 2). A male whose spouse is available to help with ADL's may not perceive himself as having an ADL limitation. A readily available source of support, a spouse can provide the help with ADL's or IADL's that may not be otherwise provided in a community setting if paid help is the only alternative. A functionally impaired female may be placed in a nursing home because there is no source of support available in her own household and paid help is the only alternative.

Table 8

Percent distribution of functionally impaired elderly persons, by marital status, age, sex, and race: 1982

Age, sex, and race	Total persons	Married	Not married
	Percent distribution		
Total	100.0	43.8	56.2
Age			
65-69 years	100.0	61.8	38.2
70-74 years	100.0	54.7	45.3
75-79 years	100.0	43.9	56.1
80-84 years	100.0	31.9	68.1
85 years or over	100.0	19.8	80.2
Sex			
Male	100.0	72.6	27.4
Female	100.0	27.6	72.4
Race			
White	100.0	45.2	54.8
Black	100.0	34.2	65.9

Living arrangement

Data on the living arrangement in the household in which the sample person lived is shown in Table 9. The data provide information on whether the sample person lived alone, with a spouse, with children, with other relatives, or with nonrelatives. The data presented are not intended to show that the sample person was the householder in all cases.

The majority of functionally impaired persons lived either by themselves or with a spouse only. The percent of individuals living by themselves increased with age, from 22 percent for persons 65-69 years of age to 36 percent for persons 80 years of age or over, probably reflecting increased widowhood. The percent of sample persons living with spouse only decreased from 49 percent for persons 65-69 years to 14 percent for those 85 years of age or over. The next category for which there was a noticeable difference by age was living with a son or daughter. This occurred more frequently as age increased, from 9 percent for persons 65-69 to 34 percent for those 85 years of age or over.

The majority of black persons and white persons lived either by themselves or with a spouse. Black persons, however, seemed to draw on a more extended range of relationships in their living arrangement than white persons did. About two-thirds of the white persons lived alone or with a spouse only compared with only about one-half of the black persons.

Nearly 71 percent of males lived with a spouse, but only about 27 percent of females lived with a spouse. The more common living arrangement for females was living alone (40 percent). Living with children was more common among females (23 percent) than among males (8 percent).

Living quarters

Data on type of living quarters occupied by functionally impaired aged persons are presented in Table 10. In Table 10, "House" refers to detached, duplex, or row houses. "Rented room" refers to a room in a rooming or boarding house, in a hotel or motel, or to a rented room in a private house. "Other" includes permanent or mobile trailers and any other type of living quarters not classified separately. Shown in this table is the percent distribution of persons by living quarters only, not by ownership status. The data does not show whether the house was owned by the sample person, by a family member, or whether it was rented; conversely, there is no indication that an apartment may have been owned as a condominium.

Across all age, race, and sex classifications, the majority of persons lived in houses. A higher percent of males than of females lived in houses, about 79 and 72 percent, respectively. A higher percent of females than of males lived in apartments, 22 percent compared with about 13 percent. Although not shown here, the increasing percent of males who lived in apartments at each age interval may reflect increasing widowhood among them as they age. When the spouse dies, the individual is likely to move to smaller, more manageable living quarters. Widowhood among females may already be reflected in their living arrangement, however. More females are already in apartments because more are alone in all age intervals under consideration. There were no large differences by race.

Data are presented on the special features that functionally impaired persons have in their homes in Table 11. To a large extent, these features are used to increase mobility. Percents are calculated over the total number of persons included in each age, race, and sex classification. An individual may have responded to more than one of the first six items listed, but only one entry was allowed if the response was "None."

About one-quarter of the males and about one-third of the females had special features that support mobility. Of the special features reported, extra hand rails or grab bars were reported most often. These were reported by about 19 percent of males and by about 23 percent of females.

Table 9

Percent distribution of functionally impaired elderly persons, by type of living arrangement, age, race, and sex: 1982

Age, race, and sex	Total persons	Type of living arrangement						
		Live alone	Live with spouse only	Live with spouse and other relatives	Live with son or daughter	Live with other relatives	Live with an employee	Live with non-relative
	Percent distribution							
Total	100.0	30.6	35.6	6.9	17.6	6.7	(1)	1.9
Age								
65-69 years	100.0	22.4	49.4	11.5	8.5	6.7	(1)	1.2
70-74 years	100.0	28.4	45.3	7.7	10.4	6.1	(1)	1.9
75-79 years	100.0	32.1	36.4	6.1	16.7	5.8	(1)	2.3
80-84 years	100.0	36.1	26.6	4.3	22.1	8.3	(1)	1.8
85 years or over	100.0	36.2	14.4	3.9	34.3	7.1	1.8	2.3
Race								
White	100.0	31.0	37.4	6.6	16.9	5.8	(1)	1.5
Black	100.0	28.2	22.7	9.6	22.3	13.1	—	4.2
Sex								
Male	100.0	13.9	58.2	12.8	8.2	4.6	(1)	1.9
Female	100.0	40.0	22.9	3.7	22.9	7.9	(1)	1.9

[1] Less than 1 percent.

Table 10

Percent distribution of functionally impaired elderly persons, by type of living quarters, age, sex, and race: 1982

Age, sex, and race	Total persons	Type of living quarters House	 Apartment	 Rented room	 Other
			Percent distribution		
Total	100.0	74.3	18.4	(1)	6.7
Age					
65-69 years	100.0	76.8	14.8	(1)	7.7
70-74 years	100.0	73.8	18.3	(1)	7.6
75-79 years	100.0	73.7	18.8	(1)	7.3
80-84 years	100.0	74.0	20.5	(1)	4.9
85 years or over	100.0	72.8	20.6	1.9	4.8
Sex					
Male	100.0	79.0	12.7	(1)	7.5
Female	100.0	71.7	21.6	(1)	6.1
Race					
White	100.0	73.5	18.4	(1)	7.4
Black	100.0	79.7	18.6	(1)	(1)

[1] Less than 1 percent.

Table 11

Percent of functionally impaired elderly persons, by special features in the homes, age, sex, and race: 1982

Age, sex, and race	Special feature Extra handrails or grab bars	 Ramps	 Elevators or stair lifts	 Extra wide doors or hallways	 Push bars on doors	 Raised toilet	 None
				Percent			
Total	21.8	3.6	3.6	4.4	1.0	5.7	69.9
Age							
65-69 years	17.3	3.5	2.5	3.7	(1)	4.3	74.4
70-74 years	20.6	3.8	4.2	4.1	1.0	5.2	71.0
75-79 years	22.9	4.2	3.6	4.5	1.1	5.4	69.1
80-84 years	24.4	3.5	4.0	5.3	1.5	6.5	66.7
85 years or over	24.7	3.1	3.8	4.8	(1)	7.5	66.9
Sex							
Male	19.3	3.3	2.4	3.8	1.0	3.5	74.4
Female	23.2	3.8	4.3	4.8	1.1	6.8	68.0
Race							
White	23.3	4.0	3.8	4.7	1.1	6.3	69.1
Black	11.9	26.4	2.1	2.9	(1)	1.9	74.9

[1] Less than 1 percent.

NOTE: Sum of items is greater than 100.0 percent because more than one feature may be present in home.

All persons were asked which additional features would make things easier or more comfortable for them. Data on the features that would make things easier or more comfortable if there were no special features reported in the residence are presented in Table 12. The response most often given (about 69 percent) was "None." Of the special features identified, about one-fifth cited extra handrails or grab bars as potentially being the most helpful. The next most often reported feature (about 7 percent) was a raised toilet.

The data from Table 12 indicate that only a few of the special features in the home were felt to make things easier for persons. This may mean one of two things: either individuals are not aware of the advantages of special features in the home and how to obtain them, or their problems are not severe enough that special features are perceived as useful. If individuals do not have any of the features in their homes, they may have adapted to what is there, e.g., by holding onto walls for support or by relying on someone else to get things from another floor of the home. Thus, they may not be aware of the advantages offered by special adaptations to the home. A review of the data in Table 3, however, shows that most functionally impaired persons did not have severe mobility problems. Persons in the community may remain there not because of adaptations to the home but because the problems are not severe enough to require adaptations to the home.

Income

Data on family income, which includes the income of the sample persons and all members of the family living with them, are presented in Table 13. Income of unrelated persons living with the sample person was not included. Income was asked for the 12 months prior to interview and included wages and salary, net income from a business or farm, pensions, dividends, interest, net income from rent, social security payments, and any other money income such as welfare.

At the time of the 1982 Survey, 60 percent of functionally impaired aged persons and their families had total family incomes of less than $10,000. In contrast, only 25 percent of all households headed by an aged person reported family income of less than

Table 12

Percent of functionally impaired elderly persons, by special features that would facilitate performing activities of daily living or instrumental activities of daily living, age, sex, and race: 1982

	Special feature						
Age, sex, and race	Extra handrails or grab bars	Ramps	Elevators or stair lifts	Extra wide doors or hallways	Push bars on doors	Raised toilet	None
	Percent						
Total	22.8	3.0	3.5	1.5	1.7	7.3	69.4
Age							
65-69 years	21.4	2.4	3.1	1.8	2.1	6.9	71.3
70-74 years	23.6	3.6	3.3	1.9	1.8	7.4	68.5
75-79 years	24.0	2.5	3.6	1.3	1.3	7.4	69.0
80-84 years	22.1	3.0	3.6	1.1	1.2	7.1	69.8
85 years or over	23.1	3.6	4.0	1.0	2.0	7.7	67.9
Sex							
Male	20.8	3.2	2.9	2.9	1.7	5.8	73.1
Female	22.2	2.7	3.6	1.3	1.6	7.6	62.0
Race							
White	21.4	2.7	3.2	1.3	1.4	6.9	72.2
Black	32.9	5.0	5.6	2.7	3.8	10.3	59.0

NOTE: Sum of items is greater than 100.0 percent because more than one feature may be needed.

Table13

Percent distribution of functionally impaired elderly persons, by income of the elderly and their families who live with them, age, sex, and race: 1982

Age, sex, and race	Total persons	Less than $3,000	$3,000 to $6,999	$7,000 to $9,999	$10,000 to $19,999	$20,000 or more
	Percent distribution					
Total	100.0	3.6	36.5	20.2	26.8	12.9
Age						
65-69 years	100.0	1.8	31.7	20.0	34.5	11.9
70-74 years	100.0	2.8	36.6	21.5	29.5	9.6
75-79 years	100.0	5.2	39.3	20.2	22.4	13.0
80-84 years	100.0	3.7	39.5	19.6	23.1	14.1
85 years or over	100.0	5.2	36.4	19.2	22.0	17.3
Sex						
Male	100.0	1.5	29.2	23.1	32.8	13.3
Female	100.0	4.9	40.9	18.4	23.2	12.6
Race						
White	100.0	3.1	34.1	20.6	28.1	14.1
Black	100.0	7.4	53.5	17.2	17.5	4.5

$10,000 (U.S. Bureau of the Census, 1984b). The comparable percent for incomes under $20,000 were 87 percent and 62 percent, respectively. Thus, the functionally impaired elderly in 1982 were living under more straitened financial circumstances than the aged in general.

Summary and conclusions

Slightly more than 5 million persons, or 19 percent of the total aged Medicare population, were functionally impaired and living in the community in 1982. Relative to the total aged population, they were older, more of them were female, more were black, and they lived in more financially straitened circumstances.

Functional impairments increased with age and multiple impairments increased notably after 75 years of age. The maintenance of cognitive functioning ability despite increasing functional impairment appears related to continued maintenance in the community. Cognitive functioning among functionally impaired persons in the community was found to be relatively intact until 85 years of age or over. Only at that age bracket did more than 10 percent of the functionally impaired persons show moderate to severe impairment in cognitive functioning. The combined effects of functional impairments in key areas of daily living and impaired cognitive functioning appear to provide a strong impetus toward the need for full-time nursing home care. About 20 percent of persons 85 years of age or over were in nursing homes and about 35 percent of persons aged 85 years of age or over who were living in the community were functionally impaired.

The data indicate a pattern of progression in impairments in the capacity to carry out the functions of daily living. The progression seems to be one that moves from an inability to perform heavy work or carry out activities related to social functioning outside the home to increasing impairments in the ability to carry out activities inside the home, and eventually to impairments in caring for one's self. Three-fourths of the functionally impaired elderly persons reported difficulty with doing heavy work around the house and about one-half had problems with shopping for groceries and going places outside walking distance. These suggest an initial contraction in the range of activities involving the acquisition of goods and services outside the household followed by a decline in the ability to manage one's household and in the ability to live alone. About 30 percent of the functionally impaired elderly reported problems in one or more of the following activities which point to a diminishing ability to live alone:

- Preparing meals.
- Managing money.
- Taking medicine.
- Doing light work around the house.
- Making telephone calls.
- Getting around outside in one's own yard.

The 1982 Long-Term Care Survey confirmed earlier findings that, among persons with impairments in the ability to perform activities of daily living (ADL's), most have problems in bathing and fewest in eating. Males tended to report the absence of ADL limitations more frequently than females. This may be attributable to the fact that a smaller percent of males than of females lived alone. In fact, 71 percent of the functionally impaired males still lived with their spouses compared with only 27 percent of the females. This suggests that functional limitations in ADL's may not be as apparent to males whose spouses are available to provide needed support. Females living alone may be more aware of functional limitations in ADL's because of the effort required to obtain care from someone outside their own household.

Race differences were found in the distribution of functional limitations. A higher proportion of black persons than of white persons showed ADL impairments at each age. The data also suggest that the onset of ADL limitations begin to appear at younger ages among black persons. In addition to the higher prevalence of ADL limitations among black persons, they showed greater prevalence of impairment in cognitive functioning.

The fact that a higher proportion of black persons were functionally and cognitively impaired and remained in the community is of interest. The data suggest the use of a more extended support system among black persons than among white persons. Although the proportion of white persons living with a spouse was greater than for black persons, the proportion of black persons living with children, other relatives, or nonrelatives was much higher.

The data, however, generally point to the continued viability of filial and kinship ties as a source of help to functionally impaired persons. Among functionally impaired persons 80-84 years of age, 47 percent of the persons not living alone with a spouse were living with their children or other relatives. Similarly, among those 85 years of age or over, where the degree of functional impairment and the need for assistance were probably even greater, 52 percent were living with their children or other relatives. Thus, it is clear that there is a great reservoir of informal help based on kinship available to functionally impaired persons. One could speculate that programs that offer respite to caregivers might increase access to this source of community support.

Another significant finding of this study is the widespread use of special equipment to promote the performance of ADL's. It is unclear to what extent the greater use of special equipment would facilitate continued community residence of functionally impaired persons, but it does seem that this is an area in which greater public awareness should be promoted. This and the finding that children and relatives provide a significant reservoir of help and support to functionally impaired aged persons are probably the two areas to which future policies might be directed to mobilize forces to facilitate continued stay in the community. As an example, some special equipment could be covered in whole or part under the Medicare program as an extension of the durable medical equipment benefit.

Data in this article show that functional and cognitive limitations increased with age. To the extent that cognitive functioning remains relatively unimpaired, large numbers of persons appear able to cope with functional limitations. Functional capacity in both spheres declines with age, so that by the time persons reach 85 years of age a greater proportion require nursing home care. Though 20 percent of these persons receive nursing home care, the vast majority do not (U.S. Bureau of the Census, 1984a). Respite care services to informal caregivers and the partial or complete coverage of special equipment under Medicare could be helpful in forestalling premature nursing home placement. It still needs to be recognized, however, that the joint progression of functional and cognitive impairments may reach the point where the community retention of the aged person can be achieved only at great financial, social, and physical costs. At the appropriate time, placement in a nursing home may be the most viable option.

To obtain further insights into the incidence and the progression of functional impairments among the aged, the 1984 LTC Survey followed up on the 1982 sample and incorporated persons who became 65 years of age in the interim and were found to be functionally impaired. This survey was designed with both a cross-sectional and a longitudinal component. The cross-sectional component included a sample of all functionally disabled persons 65 years of age or over as of April 1, 1984, whether living in the community or in institutions. The longitudinal component was a subset of the cross-sectional component and included all persons in the 1982 Survey, whether living in the community, in institutions, or deceased in 1984.

Data from the cross-sectional component should lend some insight into the prevalence of functional limitations at a point in time and will allow comparison of persons in the community and in institutions. Data from the longitudinal component should provide estimates of the incidence of functional and cognitive impairments of persons between 1982 and 1984. These data should provide some basis for estimating the probability of transition from community-based living to institutionalization to death. A logical extension of this type of analysis would be to identify the combinations of ADL and cognitive functioning limitations, the degree of limitation, and accompanying social factors that are associated with institutionalization.

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Medicare case-mix index increase

by Paul B. Ginsburg and Grace M. Carter

Medicare paid hospitals a higher amount per admission in 1984 than had been planned because the case-mix index (CMI), which reflects the proportion of patients in high-weighted DRG's versus low-weighted ones, increased more than had been projected. This study estimated the degree to which the increase in the CMI from 1981 reflected medical practice changes, the aging of the Medicare inpatient population, changes in coding practices of physicians and hospitals, and changes in the way that the Health Care Financing Administration collects the data on case-mix. All of the above, except for aging, contributed to the increase in the CMI.

Overview

The Medicare case-mix index (CMI) reflects the costliness of a hospital's Medicare patient mix. The costs are based on the diagnosis-related group (DRG) in which each patient is classified and the weight that Medicare has applied to each DRG to reflect patients' relative costs. For Medicare patients for whom payment was made under the prospective payment system (PPS) in States not waived from the Medicare reimbursement system, the CMI for fiscal year 1984 was 9.2 percent higher than that for calendar year 1981. Because the calculations of budget neutrality that underlaid the PPS rates for 1984 assumed that the CMI would increase by only 3.4 percent, Medicare paid 5.6 percent more per PPS admission in that year than had been planned.[1]

To guide the Health Care Financing Administration (HCFA) in how to deal with the unexpectedly large increase in the CMI, we undertook a study of the components of the increase. We sought to assess what part of the increase resulted from changes in coding practices, what part from changes in medical practices, and what part from changes in Medicare patients' resource needs.

We used two extensive data bases on hospital services for Medicare enrollees: Medicare claims files maintained by HCFA and hospital discharge abstract data collected by the Commission on Professional and Hospital Activities (CPHA). CPHA is a private organization that prepares reports for its subscriber hospitals that enable them to compare themselves with their peers on dimensions such as length of stay and certain indicators of quality. We conducted analyses with files at three levels: the hospital system, the individual hospital, and the individual DRG.

In this article, we discuss possible explanations for the increase in the CMI and describe the two data bases. We also examine the CMI change at a system-wide level. Descriptive data that document the increase in the CMI over the 3-year span are presented, and the role of aging of the Medicare population in CMI changes during this period is examined. A series of regression models are described that focus on separating the 1981-84 increase in the CMI into a component that reflects continuation of trends prior to PPS versus shifts coinciding with PPS. One of the models is also used to examine differences in PPS effects by hospital type.

Following the CMI-level analyses, we then focus on changes in the proportion of discharges in individual DRG's and groups of DRG's. This more detailed analysis sheds additional light on the roles played by coding changes versus medical practice changes. Finally, we recapitulate the results of the sorting of the increase in the CMI into components and discuss the implications for policy.

Reasons for case-mix index increase

The increase in the case-mix index (CMI) could have been the result of coding changes, medical practice changes, and changes in patients' medical needs. Two aspects of coding changes could have been at work: inconsistencies between the data base used to measure the 1981 value of the CMI and that used for the 1984 value and changes in the practices of hospitals and physicians in documentation and coding.

The 1981 and 1984 data bases—MEDPAR (Medicare analysis provider and review files) and PATBILL (information available for inpatient hospital care from the patient bill)—were constructed differently. MEDPAR—the 1981 research file that was used to calculate the weights (relative costs) for each diagnosis-related group (DRG)—was constructed from a sample of Medicare bills submitted under the prior cost-based reimbursement system. Most bills did not include ICD-9-CM codes, but a narrative with the names of diagnoses and (if applicable) surgical procedures. From these narratives, the Health Care Financing Administration (HCFA) coded the principal diagnosis, the presence of additional diagnoses, the first surgical procedure listed, and the presence of additional surgical procedures. The DRG was then assigned from these codes and from the beneficiary's age, sex, and where the patient was discharged to.

PATBILL—the 1984 file—was also constructed from a sample of Medicare bills, but because the form

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[1] In addition to data from fiscal year 1984, we have processed data from the first two quarters of fiscal year 1985. Although the CMI from the latter period is reported and used to discuss the extent of continuing PPS effects on the CMI, much of the analysis focuses on the experience through the end of fiscal year 1984.

used to identify inpatient hospital expenses and other data related to diagnosis and discharge was changed, substantially more information was available to classify patients into DRG's. The physician discharging the patient determined the principal diagnosis (as in the 1981 file), but the diagnosis was translated to ICD-9-CM code by the hospital's medical records personnel, rather than by HCFA. Based on a study of the medical record, up to four secondary diagnoses, which specify the principal condition more accurately or indicate substantial complications or comorbidities, could be listed, as could up to three major procedures. Because the amount of payment for hospitals under the prospective payment system (PPS) was based on the information on the bills in 1984, but not in 1981, attention to the accuracy of the former is likely to be much greater.

In addition to the discrepancies between the two Medicare data bases, the CMI is likely to have been affected by changes in coding practices within hospitals. With reimbursement now dependent on classification of patients into DRG's, more attention is likely to be paid to physician documentation on the medical record of diagnoses and procedures and to the coding of this information from the medical record onto the bill that is submitted to the Medicare intermediary. Because the presence of additional diagnoses and procedures tends to change patient classifications toward higher-weighted DRG's, increased thoroughness in documentation and coding is likely to increase the CMI.

Changes in hospital coding practices could go beyond increased thoroughness, however. A wealth of information is being offered to hospitals explaining how to code to maximize reimbursement under the DRG system. Many of these suggestions focus on coding decisions that are subject to considerable judgment, and they point out the reimbursement implications of all of the possible outcomes. Coding practices aimed at maximizing reimbursement would also increase the CMI, but they are difficult to separate from simple thoroughness.

Changes in medical practices can affect the CMI in several ways. The development and diffusion of new procedures affect the number and, thus, the proportion of discharges in specific DRG's. For example, increasing use of coronary artery bypass surgery and angioplasty increases the proportion of discharges classified into DRG's 106, 107, and 108. Some of these additional discharges reflect a shift from medical DRG's, and others reflect a net addition to hospital discharges. Such a trend increases the CMI over time, because these DRG's have weights much higher than the average for both all DRG's and other DRG's that such patients might have been classified into had they been admitted for alternative medical treatments. In contrast, increasing use of lens procedures (DRG 39) lowers the CMI, because the weight for that DRG is relatively low. Although PPS might have affected the CMI through changes in these medical practice trends, most of the changes between 1981 and 1984 in the CMI that are the result of increasing use of major new procedures are likely to have been independent of PPS.

Changes in the location of treatment can affect the CMI. The shift of surgery to outpatient settings tends to increase the CMI, because the majority of those patients no longer hospitalized would have been classified into DRG's with lower-than-average weights. Any PPS impacts on the CMI through this mechanism would depend on whether this trend in medical practice was speeded up or retarded by the incentives of PPS reimbursement and the actions of peer review organizations.

Finally, aging of the population of Medicare inpatients may affect the CMI. It is well known that the Medicare population is aging, and the CMI is likely to vary by age of patients. But the population of Medicare *inpatients* may be aging faster than the population of Medicare *enrollees*. With the implementation of the working aged provisions of the Tax Equity and Fiscal Responsibility Act of 1982, those working Medicare enrollees 65-69 years of age, that elect to have their employment-based health plan as the primary payer and receive no Medicare hospital benefits would not be classified as Medicare inpatients.

Another factor affecting the aging of the Medicare inpatient population is the shift of some cases to outpatient settings. This is likely to have a differential effect across age categories, though the overall direction is not clear. Some have pointed out that technological change is now enabling older Medicare patients to use outpatient settings for certain procedures, whereas younger Medicare patients had already been treated in outpatient settings. The effects of such a phenomenon have already been taken into account in the context of changes in the location of service.

Data sources

Two major data bases on Medicare enrollees' inpatient episodes were used in this study: information from hospital bills that come to the Health Care Financing Administration (HCFA) through its intermediaries and discharge abstract data sent to the Commission on Professional and Hospital Activities (CPHA) from its subscriber hospitals. The latter data base is known as the Professional Activity Study (PAS).

Medicare data

We used two different Medicare files for 1981 and 1984-85: MEDPAR and PATBILL.[2] We do not describe the MEDPAR file here, because it has been used extensively by researchers for some time (Pettengill and Vertrees, 1982.)

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[2] The MEDPAR file is also available for calendar year 1982. We did not make use of it because it was of lower quality than the 1981 file. A higher proportion of discharges did not have a diagnosis-related group assigned.

The information on fiscal years (FY's) 1984 and 1985 discharges came from a file constructed by the Rand Corporation; it contained records from a 20-percent sample of bills for that year that HCFA had received through the middle of May 1985.[3] Because this file was incomplete, we had to adjust for the fact that bills taking the longest to reach HCFA differ from the average bill. To deal with this problem, Rand has developed for HCFA a "backcasting" model to adjust for these differences.[4] The adjustment has a smaller effect on the case-mix index than on some other variables such as the percentage of outliers. For the second quarter of FY 1985, the adjustment increased the estimate of the CMI for prospective payment system (PPS) discharges by approximately 1 percent.

Professional Activity Study data

The patient abstract records that comprise the PAS contain demographic and diagnostic data that include such items as the patient's age, sex, race, date of admission, hospital service, admission diagnosis, principal diagnosis, additional diagnoses, and principal and other operative procedures. Since 1979, all diagnoses and procedures have been coded in ICD-9-CM form. Hospitals also submit information on the expected source of payment.

Data in this study are from all PAS hospitals reimbursed under PPS and that sent CPHA complete patient data continuously throughout the January 1981-September 1984 period. Only records listing Medicare as the expected principal source of payment were used. This left a panel of 705 short-term, general care hospitals that supplied records on 5,942,317 Medicare discharges. Later, however, an additional quarter of data became available, reducing the panel slightly. The smaller panel was used only to assess continuing PPS effects.

For this study, the PAS data have two advantages over the Medicare claims files. First, the collection and editing procedures did not change during the period studied. This means that changes in case mix observed over time were not influenced by changes in the collection instrument, as was the case for Medicare data. Second, PAS data are available with no interruption throughout the 1981-84 period. This facilitates separating shifts in case mix coinciding with the beginning of PPS from underlying prior trends.

The disadvantage of PAS is that it comprises a sample of self-selected subscriber hospitals instead of a random sample of hospitals, except in seven States where CPHA obtains data on all hospitals through data exchange processing agreements with statewide associations.

The panel of hospitals used in this study is generally representative of hospitals that participate in the PPS. The most significant discrepancies are an underrepresentation of small hospitals, of hospitals in the South, of Government hospitals, and of investor-owned hospitals. The underrepresentation of investor-owned hospitals is problematic, because the small number represented in the panel precludes drawing inferences concerning differences in the CMI increase for this group compared with other ownership groups.

To examine differences between the panel and the universe that are not explained by hospital type and that might be relevant to this study of the CMI, we regressed each hospital's MEDPAR CMI on a series of hospital type variables and a binary variable for whether the hospital was in the PAS panel. As shown in Table 1, after adjustment for hospital type, PAS hospitals had a CMI in 1981 that averaged 1.0 percent higher than that of otherwise similar hospitals.

Though small, such a difference could affect this analysis. It might reflect PAS hospitals coding more accurately than other hospitals prior to PPS. This could be a combination of hospitals placing more emphasis on careful coding, perhaps associated with their interest in reports from CPHA, and the results of the training that CPHA gives to medical records technicians at participating hospitals.[5] If more accurate coding explains an important part of this difference, this means that the effects of PPS on coding that are measured with data on PAS hospitals only could be understated. That is, if the PAS hospitals already coded more accurately prior to PPS, they might have a smaller increase in their CMI's as a result of PPS-induced attention to accuracy.

To test this hypothesis, we ran the model just described with 1984 PATBILL data, including variables for the quarter in which the hospital began PPS (Table 1). The coefficient for the PAS variable fell from 0.0099 in 1981 to 0.0032 in 1984 and was no longer statistically significant. This substantial narrowing of the difference between PAS hospitals and others is likely to reflect differential changes in coding. Although we cannot rule out other unspecified variables, a diminished difference in coding practices is the most likely explanation for the difference between the 1981 and 1984 coefficients. Translating the CMI difference between PAS and non-PAS hospitals into percentage terms, and taking into account the fact that our PAS panel comprises roughly one-seventh of the PPS universe, we estimate that time-series analysis of PAS data will understate the effect of PPS on the CMI by 0.6 percentage points.

Case-mix index level analysis

The case-mix index has increased substantially during the time the prospective payment system (PPS) has been in effect. As shown in Table 2, the CMI for PPS discharges was initially 7.3 percent above the

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[3] We used the same sampling algorithm that HCFA used in drawing the sample of bills for MEDPAR.

[4] Unfortunately, a published description of this model is not yet available.

[5] MEDPAR was built not from hospital coding of diagnoses and procedures, but from a diagnostic narrative included on the bill, therefore, effects of better coding would have to have improved this narrative for this explanation of the regression coefficient to be correct.

Table 1

Regression of case-mix index on hospital characteristics and Professional Activity Study status: 1981 and 1984

Characteristic	1981 Coefficient	1981 Standard error	1981 Significance level	1984 Coefficient	1984 Standard error	1984 Significance level
Professional Activity Study panel	0.010	0.005	0.04	0.003	0.004	n.s.
Teaching status	—	—	0.0001	—	—	0.0001
No teaching	−0.135	0.014	—	−0.068	0.010	—
Minor teaching	−0.124	0.014	—	−0.057	0.010	—
Major teaching	0.000	c.g.	—	—	c.g.	—
Control	—	—	n.s.	—	—	0.0001
Government	0.002	0.006	—	−0.004	0.004	—
Private nonprofit	0.007	0.006	—	0.013	0.004	—
Investor-owned	0.000	c.g.	—	—	c.g.	—
Number of beds	—	—	0.0001	—	—	0.0001
1-99	−0.128	0.010	—	−0.190	0.007	—
100-299	−0.078	0.010	—	−0.135	0.007	—
200-299	−0.055	0.010	—	−0.099	0.007	—
300-499	−0.021	0.010	—	−0.065	0.007	—
500 or more	0.000	c.g.	—	0.000	c.g.	—
Rural location	−0.022	0.004	0.0001	−0.034	0.003	0.0001
Region	—	—	0.0001	—	—	0.0001
Northeast	−0.012	0.005	—	−0.032	0.004	—
North Central	−0.036	0.008	—	−0.042	0.004	—
South	−0.062	0.005	—	−0.052	0.004	—
West	0.000	c.g.	—	0.000	c.g.	—
Prospective payment system start	—	—	—			0.0001
1983: IV	—	—	—	0.024	.003	—
1984: I	—	—	—	0.012	.003	—
1984: II	—	—	—	0.009	.005	—
1984: III	—	—	—	0.000	c.g.	—
Intercept	1.276	0.016	0.0001	1.304	0.011	0.0001

NOTES: Based on 4,877 (1981) and 4,892 (1984) hospitals: R^2 = 0.23 (1981) and 0.44 (1984); c.g. = comparison group; n.s. = not significant.

SOURCE: The Rand Corporation: Analysis of calendar year 1981 MEDPAR and fiscal year 1984 PATBILL files.

Table 2

Case-mix index increase for discharges under the prospective payment system

Quarter	Case-mix index 1983-85 quarter	Case-mix index 1981 quarter	Percent change
Oct.-Dec. 1983	1.131	1.054	7.3
Jan.-Mar. 1984	1.132	1.049	7.9
Apr.-Jun. 1984	1.140	1.047	9.0
Jul.-Sept. 1984	1.154	1.035	11.5
Oct.-Dec. 1984	1.177	1.054	11.7
Jan.-Mar. 1985	1.179	1.049	11.4

NOTES: Diagnosis-related group weights for fiscal year 1984 were used for all entries. Excludes waiver States and exempt units, includes backcasting adjustments.

SOURCE: The Rand Corporation: Analysis of calendar year 1981 MEDPAR and fiscal year 1984 PATBILL files.

level in the corresponding quarter of 1981. The percent change from 1981 increased in each of the next three quarters, as additional hospitals came under the PPS and experience was gained with the program. The CMI for the July-September quarter of 1984 was 11.5 percent above that for the comparable 1981 quarter. For all of fiscal year 1984, the increase from calendar year 1981 was 9.2 percent. Since the end of fiscal year 1984, however, the increase in the CMI appears to have slowed substantially. However, preliminary analysis of more recent data that have become available indicates that this slowdown was a transient phenomenon. Substantial increases in the CMI are seen during the second half of fiscal year 1985.

That PPS has something to do with this increase in the CMI is illustrated in Table 3, where the experience of hospitals in the four States with waivers to use an alternative reimbursement system is compared with those under PPS. The Medicare claims data show that the CMI in waiver States increased only 2.2 percent from calendar year 1981 to fiscal year 1984, compared with a 9.2-percent increase for PPS admissions in nonwaiver States. Similar results are obtained with data from the Professional Activity Study (PAS).[6]

In this section we discuss a series of analyses conducted at the CMI (as opposed to the diagnosis-related group) level to break down the calendar year 1981 to fiscal year 1984 increase into components. First, we estimate the role of aging of the Medicare inpatient population. Second, we use a variety of

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[6] The PAS comparison is not as reliable, because two of the waiver States are severely underrepresented in the PAS panel. Note that the PAS comparison is for a different time period than the Medicare comparison.

Table 3

Case-mix index increase in waiver versus nonwaiver States

Item	Waiver States	Nonwaiver States
	Percent change	
Medicare data, calendar year 1981—fiscal year 1984	2.2	9.2
Professional Activity Study data, Fourth quarter 1981—fourth quarter 1984	0.3	5.9

NOTE: Waiver States are Maryland, Massachusetts, New Jersey, and New York. Nonwaiver States are those under the prospective payment system.

SOURCE: The Rand Corporation: Analysis of calendar year 1981 MEDPAR and fiscal year 1984 PATBILL files and of data from the Professional Activity Study.

methods to decompose the CMI increase into pre-PPS trends in the CMI and in shifts associated with PPS.

The PAS data are best suited to measuring pre-PPS trends, because of the continuous time series available. Medicare data, however, are particularly useful in investigating differences during 1984 between hospitals on PPS and those not yet under the program and among hospitals with different amounts of PPS experience.

Aging of Medicare inpatient population

To estimate the effect of aging of the inpatient population, we used the Medicare claims data to calculate the CMI by age group and the proportion of Medicare discharges in each age group in 1981 and 1984. As a check, we calculated the CMI by age group with both 1981 data and 1984 data.

As shown in Table 4, aging did not affect the CMI. Using CMI's by age group from 1981 data, the 1984 age distribution would have resulted in a 1981 CMI of 1.0490, close to the actual 1981 CMI of 1.0486.[7] Similarly, the 1981 age distribution would have resulted in a 1984 CMI of 1.1183, close to the actual 1984 CMI of 1.1181.

The fact that the CMI does not increase monotonically with age accounts for this somewhat unexpected result. The CMI rises with age throughout the younger age groups, but peaks at 70-74 years of age and then declines. This pattern is generally consistent with data on charges per admission.[8]

Table 4

Percent distribution of Medicare inpatients and case-mix index (CMI), by age: 1981 and 1984

	1981		1984	
Age	Percent	CMI	Percent	CMI
Total	100.00	1.0486	100.00	1.1181
Under 65 years	11.91	1.0356	11.30	1.1063
65-69 years	22.45	1.0386	21.17	1.1233
70-74 years	21.61	1.0633	21.05	1.1404
75-79 years	18.55	1.0511	19.41	1.1176
80-84 years	13.69	1.0444	14.43	1.0972
85 years or over	11.78	1.0555	12.65	1.1065

SOURCE: The Rand Corporation: Analysis of calendar year 1981 MEDPAR and fiscal year 1984 PATBILL files for the nonwaiver States.

Time pattern of case-mix index increase

In the analyses here, we attempt to separate the increases in the CMI occurring between 1981 and 1984 that are associated with the introduction of PPS from those that reflect pre-PPS trends. Analyses with both data bases indicate that a large proportion of the increase is associated with the PPS. This is shown in Figure 1, in which quarterly estimates of the CMI are plotted from PAS data. The graph shows the steady increase in the CMI through the third quarter of 1983, and the sharp departure from trend that coincided with the implementation of PPS in the fourth quarter of 1983.

Pre-prospective payment system trend

To estimate the magnitude of the pre-PPS trend, we fitted a regression with quarterly data from the PAS panel of 705 community hospitals (Table 5). The dependent variable is based on the ratio of the current CMI to that from the January 1981 quarter. This allows each hospital to be its own control. The model accounts for trends prior to the PPS by including a linear trend that varies by hospital type. Seasonal variation affects the CMI and is captured by four seasonal indicators that vary by census division. The remaining variables in the model are intended to capture the timing of the PPS-induced increase in the CMI and will be discussed later in this article.

The regressions are weighted by the number of Medicare discharges in the hospital.[9] Two factors made weighting desirable. First, weighting reduces the variance of the estimate. Some hospitals had very few Medicare discharges in a quarter, especially in the Medicare file, which sampled 20 percent of discharges. By giving a lower weight to those hospitals in which sampling error will be more severe, we improve the precision of the estimates. Second, though the observations are CMI's for hospitals, our interest is in the typical Medicare patient discharged. By weighting in this manner, the results on factors associated with the increase in the CMI apply to the average Medicare patient in the data set.

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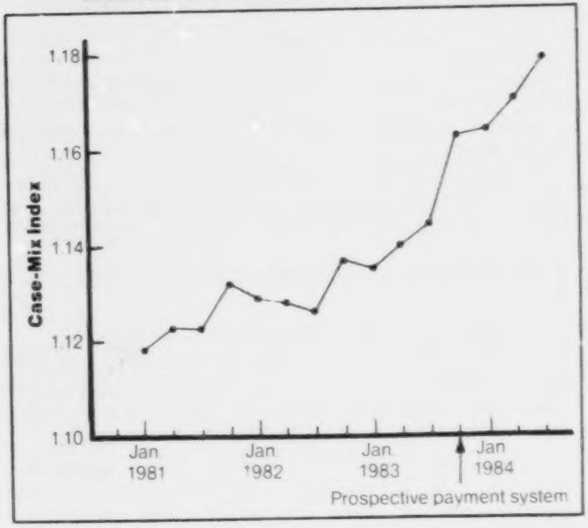
[7] The slight differences between the CMI's in Table 4 and those in Table 3 are the result of cases with missing DRG's. The hospital-level files underlying Table 3 include estimates of the missing values. Adjustments for missing values could not be made for Table 4, which is based on a discharge file instead of a hospital file.

[8] In an earlier article, we noted that 1979 data on reimbursements per admission did not exhibit this pattern (Carter and Ginsburg, 1985). Two factors may explain this difference. First, practice patterns may have changed over the 5-year period, especially during the last year with the introduction of the PPS. If reductions in length of stay were larger for older patients, then costs per admission would decline for these patients relative to those for younger patients. Second, the 1979 data were cost-based and the 1984 data are charges. Hospital types vary in their cost-to-charge ratios, and older patients may be more likely to be admitted to hospitals with lower ratios of costs to charges.

[9] In the regressions with PAS data, the weight of each observation is proportional to the number of Medicare discharges in that hospital quarter. In the regressions on Medicare data, the weight of each observation is proportional to the number of Medicare discharges in that hospital in the calendar year 1981 quarter.

Figure 1
Medicare Case-Mix Index: 1981-84



The trend-variable coefficients give the pre-PPS seasonally adjusted, annual rates of increase in the CMI by type of hospital. Each coefficient is approximately equal to the fraction by which the CMI is changed by a unit increase in the variable.[10] The variable labeled "trend for base case" gives the trend in the type of hospital that is the default for all the other variables—namely, major teaching hospitals in rural locations with fewer than 500 beds in the Pacific census division. The remaining trend interaction coefficients show how the trend changes with differences in each hospital characteristic after controlling for all other hospital characteristics. Thus, hospitals without any teaching and those with only minor teaching responsibilities had smaller pre-PPS trends than major teaching hospitals. This implies that over time teaching hospitals have been specializing in difficult cases to a greater degree. Hospitals with more than 500 beds had larger trends than smaller hospitals. In exploratory analyses, we found no differences among hospitals resulting from type of control. Recalling the small number of investor-owned hospitals in this sample, however, the only implication is that no differences between private nonprofit and public hospitals were discerned.

We estimated the average value of the pre-PPS trend by calculating the weighted average of the trend

Table 5

Regression of the log case-mix index in a hospital quarter minus the log case-mix index for the same hospital in the first quarter of calendar year 1981

Variable	Coefficient	Standard error	Significance level
April-June 1983 indicator	0.0039	0.0022	0.08
July-September 1983 indicator	0.0084	0.0022	0.0002
Fiscal year 1984 indicator	0.0111	0.0023	0.0001
On prospective payment system during quarter	0.0149	0.0020	0.0001
Number of quarters on prospective payment system	0.0022	0.0018	0.03
Trend for base case	0.0105	0.0010	0.0001
Trend by teaching status	—	—	0.0001
No teaching	-0.0025	0.0011	—
Minor teaching	-0.0042	0.0011	—
Major teaching	0.0000	c.g.	—
Trend by 500 or more beds	0.0053	0.0006	0.0001
Trend by urban location	-0.0001	0.0005	n.s.
Trend by division	—	—	0.0001
New England	-0.0117	0.0019	—
Mid-Atlantic	-0.0047	0.0027	—
South Atlantic	-0.0022	0.0015	—
East North Central	-0.0068	0.0013	—
East South Central	-0.0121	0.0026	—
West North Central	-0.0002	0.0018	—
West South Central	0.0001	0.0025	—
Mountain	0.0036	0.0021	—
Pacific	0.0000	c.g.	—

NOTE: Based on 9,869 hospital quarters, R^2 = 0.152; c.g. = comparison group; n.s. = not significant. The regression also contains 36 coefficients for the four seasons in each of the 9 census divisions. These results are available from the authors.

SOURCE: The Rand Corporation: Analysis of data from the Professional Activity Study.

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[10] The exact formula is that exp(coefficient) = 1 + fraction increase in the CMI. In the range of these coefficients, the given approximation is quite good.

coefficients for each type of hospital. The weights used were the proportion of Medicare patients discharged from that hospital type in fiscal year 1984, and were taken from our PATBILL file. We estimate that prior to PPS, the CMI was increasing at an annual rate of 0.50 percent. If this trend had continued, the CMI for fiscal year 1984 would have been only 1.38 percent higher than the CMI for calendar year 1981. The remainder of the 9.2-percent CMI increase resulted from the combination of the change in data bases from MEDPAR to PATBILL and from changes that coincided with—and most probably were induced by—PPS implementation.

Prospective payment system effects: Medicare data

A descriptive analysis with the Medicare data shows, dramatically, the effects of hospitals' beginning PPS. The percent increases in the CMI from the corresponding quarter in 1981 are shown in Table 6. The data are organized by the quarter in which the hospital began PPS.

Three important results appear in Table 6. First, substantial increases in the CMI are observed during the quarter in which hospitals first come under PPS. For example, those hospitals beginning PPS during the October quarter (most of them October 1, 1983) had an 8.7-percent increase during the period between that quarter and the corresponding quarter of 1981. In contrast, those hospitals entering PPS during the following quarter had only a 5.3-percent increase in the CMI from the October 1981 quarter to the October 1983 quarter.

Second, hospitals appear to have an increase in their CMI preparatory to their entering PPS. For example, those hospitals entering during the July quarter had a larger increase from 1981 during their April 1984 quarter than during their January 1984 quarter.

Table 6
Percent increases in the case-mix index from corresponding quarters in 1981

Discharge quarter	Quarter in which hospital entered prospective payment system			
	Oct.-Dec.	Jan.-Mar.	Apr.-June	Jul.-Sept.
	Percent change from 1981[1]			
Oct.-Dec. 1983	8.7	5.3	4.9	4.7
Jan.-Mar. 1984	8.5	8.1	5.9	5.0
Apr.-June 1984	9.8	9.3	8.5	6.7
July-Sept. 1984	12.0	11.1	11.7	11.1
Oct.-Dec. 1984	12.1	11.9	12.0	11.3
Jan.-Mar. 1985	11.8	12.6	12.7	12.5

[1] Percent change from corresponding quarter spans a variable number of years. The diagnosis-related group weights for fiscal year 1984 were used for all entries.

SOURCE: The Rand Corporation: Analysis of calendar year 1981 MEDPAR and fiscal year 1984 PATBILL files for the nonwaiver States.

Third, increases in the CMI seem to grow with each additional quarter of experience under PPS. Note the pattern for hospitals on PPS during the January 1984 quarter. During each successive quarter, the CMI increase from the corresponding quarter in 1981 was larger. However, this pattern of continued CMI increases appears to have ended abruptly with the October 1984 quarter, and those hospitals entering during the July quarter, which had the greatest preparatory increases, had no increases beyond the July 1984 quarter.

A regression model with the Medicare data confirms the descriptive findings in Table 6. Merging the 1981 and 1984 files and using the hospital quarter as the unit of observation, we regressed the percentage difference in the hospital's CMI between fiscal 1984 and the corresponding quarter in calendar 1981 on a series of variables for hospital type and PPS status (Table 7). The hospital-type variables are teaching status (as defined by interns and residents per bed), ownership, census division, number of beds, and urban or rural location. The PPS-status variables include a binary variable for whether the hospital was under PPS reimbursement during that quarter and one for the number of quarters on PPS. In addition, dummy variables for each quarter are entered to adjust for the October quarter difference spanning only 2 years.

The results show a sharp increase in the CMI associated with being on PPS. After hospital type is held constant, those hospitals on PPS had a 2.8-percent larger increase in their CMI from the corresponding 1981 quarter than hospitals not yet on PPS. The difference grows over time. The coefficient on the number of quarters on PPS indicates that during the period studied, each additional quarter of PPS experience adds 0.51 percentage points to a hospital's CMI.[11] As indicated above, however, this pattern did not continue into fiscal year 1985.

In other regressions, not reported in detail here, we explored the shape of the effect of post-PPS quarters on the CMI increase. In one version of the model, we replaced the variable for the number of quarters with three binary variables indicating whether the hospital had been on PPS for two or more quarters, three or more quarters, or exactly four quarters. The collection of three binary variables was statistically significant ($p < .01$), and the coefficients were 0.47, 0.47, and 0.63, respectively. Consequently, the linear representation in the specification of Table 7 appears to be the correct form of the variable.

We used these regression results to compute PPS's effect on the CMI for the entire fiscal year 1984, taking into account the proportion of Medicare

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[11] Correlation between a hospital's CMI in successive quarters means that the *t*-statistics are overstated somewhat. However, the *t*-statistics for the PPS variables are so large that we did not bother to make an adjustment.

Table 7

Regression of the percent difference in each hospital's case-mix index between fiscal year 1984 and corresponding quarter in calendar year 1981

Variable	Coefficient	Standard error	Significance level
On prospective payment system during quarter	2.77	0.20	0.0001
Number of quarters on prospective payment system	0.51	0.11	0.0001
Teaching status	—	—	0.0007
No teaching	-1.48	0.41	—
Minor teaching	-1.03	0.40	—
Major teaching	0.00	c.g.	—
Type of control	—	—	0.0001
Government	0.06	0.30	—
Private nonprofit	1.35	0.28	—
Investor-owned	0.00	c.g.	—
Number of beds	—	—	0.0001
1-99	-3.33	0.33	—
100-199	-2.40	0.29	—
200-299	-2.17	0.28	—
300-499	-2.08	0.24	—
500 or more	0.00	c.g.	—
Rural location	-2.14	0.21	0.0001
Census division	—	—	0.0001
New England	-1.23	0.48	—
Mid-Atlantic (Pennsylvania only)	-3.75	0.36	—
South Atlantic	0.79	0.28	—
East North Central	-2.20	0.27	—
East South Central	-0.03	0.33	—
West North Central	4.99	0.32	—
West South Central	4.94	0.30	—
Mountain	1.77	0.40	—
Pacific	0.00	c.g.	—
Quarter	—	—	0.001
Jan.-Mar.	0.19	0.21	—
Apr.-June	1.62	0.23	—
July-Sept.	2.37	0.28	—
Oct.-Dec.	0.00	c.g.	—
Intercept	6.58	0.52	0.0001

NOTE: Based on 19,700 hospital quarters that had cases in both files; R^2 = 0.126; c.g. = comparison group.

SOURCE: The Rand Corporation: Analysis of calendar year 1981 MEDPAR and fiscal year 1984 PATBILL files.

discharges that occurred while hospitals were on PPS and the proportion of those occurring while hospitals were on the program two, three, or four quarters. We concluded that PPS induced a 3.3-percent increase in the CMI for PPS discharges for fiscal year 1984.

Because of the lack of Medicare data for fiscal year 1983, we were not able to estimate increases in the CMI that were associated with the Tax Equity and Fiscal Responsibility Act of 1982 (TEFRA) or were anticipatory to PPS. This analysis depended on comparisons of 1981-84 changes between groups of hospitals entering PPS early and those entering late. Because increases anticipatory to PPS would be reflected in the 1984 CMI of the hospitals entering PPS at the end of the year, the estimate of the PPS effect is likely to be too low. Both the descriptive Medicare data in Table 6 and the analysis of PAS data described later in this article suggest such an anticipatory effect.

Prospective payment system effects: Professional Activity Study data

Through the continuous time series that is available, analysis of the PAS data gives us additional insight into the effect of PPS on the CMI. Besides enabling identification of pre-PPS trends, the PAS data permit estimates of increases anticipatory to PPS. Data analysis cannot distinguish whether this reflects a response to the reimbursement system established by TEFRA or changes in coding procedures made in preparation for PPS, which was enacted in April 1983.

The specification of the model estimated with the PAS data was discussed above (Table 5). The first three variables in Table 5 measure the effect of hospitals preparing for PPS. The first is a binary variable indicating the April 1983 quarter—the first quarter after the enactment of PPS. The coefficient for this variable was very small and not statistically significant. The coefficient for the July 1983 variables shows a substantial increase from the trend, however. Because the coefficient is approximately equal to the fraction by which the CMI is changed by a unit increase in the variable, the July 1983 quarter is estimated to be 0.84 percent higher than it would have been, based on the pre-PPS trend.

The third variable, a dummy for fiscal year 1984, reflects what happened in hospitals during the portion of that year prior to their beginning PPS. The estimates imply that for those quarters, the CMI was 1.11 percent higher than if the pre-PPS trend had continued.

The next two variables measure the post-PPS increase. At entry to PPS, the CMI increased an additional 1.49 percent above the pre-PPS 1984 level (which was itself inflated above the trend). On the average, for the period covered by this regression, it continued to increase an additional 0.22 percent for each additional quarter on PPS.[12]

Assuming that the increase in the CMI during fiscal year 1984 above the pre-existing trend is the result of the PPS, we calculate from these data that the PPS resulted in an increase of 2.9 percent in the CMI for fiscal year 1984 PPS discharges. If we then incorporate our estimate that PAS data are likely to understate the PPS effect by 0.6 percent, our PAS estimate of the total PPS effect is raised to 3.5 percent. This is reasonably consistent with the 3.3-percent PPS effect calculated from the Medicare data, which we considered an underestimate because of the absence of a way to capture the anticipatory effect.

The details of the timing of the PPS effect appear to differ between the two data sources, however. The PAS data, which show a very large preparatory effect (unmeasurable in the Medicare data), show a smaller increase from additional experience with PPS. A possible explanation is that hospitals participating in PAS were quicker than others to implement improvements in their coding practices.

Some analysts have raised the issue of whether the decline in the volume of Medicare admissions coinciding with PPS has been a factor in the increase in the CMI. Their reasoning is that admissions in lower-weighted DRG's may have declined disproportionately, thus increasing the CMI.

To test for this possibility, we added a variable to the model in Table 6 for the change in the number of admissions. Because volume changes may have had a different effect in 1984, when aggregate volume was declining, than in prior years, we added two interactions between volume change and dummy variables for the hospital's being on PPS and the quarter being from fiscal year 1984. The coefficients used to estimate the effect of PPS were essentially unchanged by the addition of these variables. Indeed, the estimates were slightly higher. None of the volume variables had a statistically significant coefficient.

We used an additional specification of the model to test for the effects of volume changes on the CMI. Instead of specifying both the dependent variable and the volume variables as the change from the first quarter of 1981, we used the change from the corresponding quarter in the previous year. Again, the estimates of the effects of PPS were unchanged, but the coefficients for the volume variables were more interesting. The coefficients on both of the interaction variables were significant and indicated that a 4-percent decline in the volume of admissions during 1984 was associated with a 0.2-percent increase in the CMI.[13]

To test whether different hospital types had relatively larger or smaller PPS effects, we added an interaction of each of the hospital-type variables with the fiscal year 1984 variable (Table 5). We used this rather than the "on PPS" variable in order to include anticipatory increases. This specification measures whether some hospital types departed from their specific pre-PPS trends to a greater extent than other hospitals. None of the intereactions were significant except for the teaching status variables. Teaching hospitals had a slightly smaller PPS effect than nonteaching hospitals. This result may be a reflection of better coding prior to PPS on the part of the teaching hospitals.[14] Thus, the increase in the CMI associated with PPS was an across-the-board phenomenon, not restricted to specific types of hospitals.

Diagnosis-related group level analysis

To understand the mechanism of the increasing case-mix index, we examined which diagnosis-related groups (DRG's) were increasing in use relative to others. We looked at which major diagnostic categories (MDC's) were responsible for the largest shares of the CMI increase, whether surgical DRG's increased relative to medical DRG's, whether there was a tendency toward the DRG's with complications and comorbidities, and what role was played by shifts to outpatient settings.

Methodology

Regression analyses related the change in the share of discharges accounted for by each DRG to its trend before going on the prospective payment system and to the introduction of PPS. For each DRG, a simple regression model was estimated with quarterly Professional Activity Study (PAS) data, in which the dependent variable was the change in the percent of Medicare discharges in that DRG compared with the corresponding quarter in the previous year. The independent variables were an intercept term, and a binary variable for whether PPS was in effect during the quarter. Such a model separated pre-PPS trends in the number of discharges from departures from those trends coinciding with PPS.[15]

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[12] Like the Medicare data, the PAS data show an end to CMI increases in the first quarter of fiscal year 1985.

[13] Details of these results are available from the authors.

[14] Teaching hospitals had a larger CMI increase between 1981 and 1984, but this was the result of a higher pre-PPS trend instead of a larger PPS effect.

On the basis of each DRG's two regression coefficients, its relative weight, and its proportion of Medicare discharges, we calculated its contribution to the pre-PPS trend in the CMI and to the shift associated with PPS.

Let

x_k = contribution of DRG_k to CMI trend; and
y_k = contribution of DRG_k to the 1984 shift.

Then

$$x_k = \frac{a_k}{T} (w_k - w); \text{ and}$$

$$y_k = \frac{b_k}{S} (w_k - (\overline{w} + 2.75T));$$

where

w_k = weight on the k^{th} DRG;
$\overline{w}$ = 1981 CMI (the average weight);
a_k = intercept in regression equation for k^{th} DRG giving annual trend in the percent of Medicare cases in the DRG;
b_k = coefficient for FYI 1984 (PPS) in the regression equation for the k^{th} DRG (FY 1984 shift);
T = pre-1984 trend in the CMI; and
S = 1984 shift in the CMI.

Thus ($\overline{w}$ + 2.75T) is what the 1984 CMI would have been if only pre-PPS trends had continued.

DRG's with weights larger than average contribute positively to explaining the CMI increase by increasing their share of Medicare discharges. DRG's with weights smaller than average contribute positively to explaining the CMI increase by decreasing their share of Medicare discharges.

The DRG's that had the largest contributions are shown in Table 8. Note that those DRG's contributing most to the pre-PPS trend are different from those contributing most to the shift.

Table 8

Diagnosis-related groups with the largest percent contributions to the case-mix index increase

Diagnosis-related group		Percent
Largest contributors to trend		
106	Coronary bypass with cardiac catheter	21
410	Chemotherapy	-10
209	Major joint procedures	9
107	Coronary bypass without cardiac catheter	8
108	Cardiothoracic procedures, except valve and coronary bypass, with pump	8
110	Major reconstructive vascular procedures age >=70 and/or complications or comorbidities	8
Largest contributors to shift		
39	Lens procedures	19
121	Circulatory disorders with acute myocardial infarction and cardiovascular complications discharged alive	8
108	Cardiothoracic procedures, except valve and coronary bypass, with pump	8
209	Major joint procedures	7
148	Major small and large bowel procedures age >=70 and/or complications or comorbidities	7

SOURCE: The Rand Corporation: Analysis of data from a panel of 705 hospitals in the Commission on Professional and Hospital Activities Professional Activity Study.

Major diagnostic categories

To obtain a broad perspective on the sources of the trend and shift components of the CMI increase, we aggregated the DRG's into the major diagnostic categories. The proportion of Medicare admissions and the contributions to the shift and trend for each MDC are shown in Table 9.

Contributions by major diagnostic category

Looking at the contributions to the trend, MDC 5 (circulatory system) has the largest contribution, both in absolute terms and relative to its proportion of Medicare discharges. It accounts for 53 percent of the trend in the CMI. Increasing rates of heart surgery play an important role in this. Substantial negative contributions to the trend in CMI increases have been played by MDC 17 (myloproliferative and poorly differentiated neoplasms) and MDC 2 (eye). The latter reflects a trend of increasing admissions for lens procedures.

The explanation for the PPS-shift in the CMI is different. Although MDC 5 has the largest contribution here as well, it is not disproportionate to its share of discharges. Large and disproportionate contributions come from MDC 8 (musculoskeletal and connective tissue) and from MDC 2. In the latter case, the trend towards higher admissions reversed, with a sharp decline beginning about the time of introduction of the PPS. The decline in the proportion of discharges classified into DRG 468 (major operating room procedure unrelated to principal diagnosis) had an important negative contribution to the CMI shift.

Surgical versus medical diagnosis-related groups

Most MDC's consist of both medical and surgical DRG's, with the latter tending to have the higher weight. In some cases the surgical procedure responsible for classifying a patient into a surgical DRG is a minor one, so that more complete coding of such procedures can increase the CMI by substituting a surgical DRG for a medical one.

To study the role of such coding, we compared the proportion of medical versus surgical DRG's in 1984 with the proportion that would have been expected if prior trends had continued. For each of the 15 MDC's that have both medical and surgical DRG's, we compared the proportion of discharges in surgical DRG's in 1984 with the proportion projected on the

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[15] The results for each DRG are in the appendix of Carter and Ginsburg (1985).

Table 9

Contributions to case-mix index trends and shifts, by major diagnostic category: 1981

Major diagnostic category	Percent of discharges, 1981	Percent contribution to Trend	Percent contribution to Shift
1. Nervous system	8.0	8	5
2. Eye	4.7	-9	18
3. Ear, nose, and throat	1.9	4	4
4. Respiratory system	10.9	-1	15
5. Circulatory system	21.5	53	20
6. Digestive system	13.2	16	8
7. Hepatobilia and pancreas	3.2	-1	3
8. Musculoskeletal and connective tissue	9.8	11	19
9. Skin, subcutaneous tissue, and breast	3.3	7	3
10. Endocrine, nutritional, and metabolic	3.4	2	2
11. Kidney and urinary tract	4.9	4	4
12. Male reproductive	3.2	3	1
13. Female reproductive	1.6	4	1
14. Pregnancy, childbirth, and the puerperium	0.1	1	-0
15. Newborns	0.0	1	-0
16. Blood and immunological	1.1	-1	1
17. Myloproliferative and poorly differentiated neoplasms	2.2	-10	-2
18. Infectious and parasitic	0.8	4	7
19. Mental	2.0	1	-0
20. Substance use and induced mental	0.5	2	-1
21. Injuries, poisoning, and toxic effects of drugs	1.1	0	2
22. Burns	0.1	-1	1
23. Other	0.8	2	3

SOURCE: The Rand Corporation: Analysis of a panel of 705 hospitals in the Commission on Professional and Hospital Activities Professional Activity Study.

basis of pre-PPS trends in each of the DRG's.

The proportion of surgical DRG's was higher in 1984 than would have been expected on the basis of prior trends. Although the total increase in the amount of surgery was not very large, the shift occurred in MDC's where there was a substantial difference between the average weight of medical and surgical DRG's.

To estimate the contribution of this shift toward surgical cases within an MDC to the overall increase in the CMI associated with the PPS, we calculated what the CMI for 1984 would have been if the proportion of discharges in each MDC remained the same, but the proportion of surgical discharges within each MDC reflected prior trends. The movement within MDC's from medical to surgical DRG's accounts for 22 percent of the PPS-induced shift in the CMI.

We are unable to infer from the above analysis whether this shift toward surgical cases reflects more complete coding of minor surgical procedures or PPS-induced surgery. Although we suspect that coding is responsible for most, research with claims data from Medicare Part B could answer this question more conclusively. Because Part B payment of physicians depends on coding of surgical procedures, it is likely that pre-PPS and post-PPS data would be comparably complete.

Pairs of diagnosis-related groups

To investigate the role of coding further, we analyzed shifts associated with PPS in pairs of DRG's that differ only by the age of the patient and the presence or absence of complications and comorbidities. We identified 107 pairs of DRG's that are relevant to the Medicare population. Of these 107 pairs, 100 had shifts toward the DRG with the higher weight. This is strong evidence that coding changes have contributed to the increase in the CMI; however, the magnitude of the effect on the CMI of this kind of coding change is actually quite modest. If the relative proportion of each pair had followed their pre-PPS trends, the PPS shift would have been only 12 percent lower than it was.[16]

Inpatient shifts to outpatient services

A substantial shift from inpatient to outpatient services, especially in surgery, has been observed in recent years. Because those patients who would have been admitted to the hospital in the past would typically have been classified into diagnosis-related groups with weights lower than average, the movement to outpatient settings tends to increase the CMI.

To investigate the role of shifts to outpatient settings, we developed a list of 37 DRG's in which outpatient care is a significant alternative (Table 10). We did so by using internal documents of the Health Care Financing Administration; a list given to hospitals by a peer review organization (PRO), specifying procedures that should not warrant hospitalization unless special circumstances apply; and suggestions of a physician-researcher at the Rand Corporation.

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[16] The actual contribution of the total set of DRG's to the PPS shift is actually much larger than this 12 percent because of changes in the frequency of cases in each pair. There is much more potential for more complex coding changes.

Table 10

Percent contributions to case-mix index trends and shifts, by diagnosis-related groups with potential for outpatient substitution

Diagnosis-related group		Percent contribution to		
		Total	Trend	Fiscal year 1984 shift
6	Carpel tunnel release	0.85	0.68	1.07
39	Lens procedures	1.51	-13.98	19.21
40	Extraocular procedures, except orbit age > = 18	1.03	1.83	0.13
53	Sinus and mastoid procedures, age > = 18	-0.10	0.14	-0.38
55	Miscellaneous ear, nose and throat procedures	0.20	0.42	-0.05
61	Myringotomy age > = 18	0.04	0.03	0.06
161	Inguinal and femoral hernia procedures, age > = 70 and/or complications or comorbidities	-0.02	0.93	-1.11
162	Inguinal and femoral hernia procedures, age 18-69 without complications or comorbidities	1.05	2.04	-0.06
187	Dental extractions and restorations	0.33	0.83	-0.22
221	Knee procedures, age > = 70 and/or complications or comorbidities	0.10	0.24	-0.04
222	Knee procedures, age < 70 without complications or comorbidities	-0.01	-0.11	0.12
225	Foot procedures	-0.03	-0.32	0.31
228	Ganglion (hand) procedures	0.18	0.41	-0.07
229	Hand procedures except ganglion	0.40	0.32	0.50
232	Arthroscopy	0.08	-0.00	0.18
261	Breast procedures for nonmalignancy except biopsy and local excision	0.03	0.05	0.00
262	Breast biopsy and local excision for nonmalignancy	0.49	1.17	-0.27
266	Skingrafts except for skin ulcer or cellulitis without complications or comorbidities	0.12	0.15	0.08
267	Perianal and pilonidal procedures	0.00	0.03	-0.03
268	Skin, subcutaneous, tissue and breast plastic procedures	0.14	0.19	0.09
270	Other skin, subcutaneous tissue, and breast operating room procedures age < 70 without complications or comorbidities	0.32	0.55	0.07
310	Transurethral procedure, age > = 70 and/or complications or comorbidities	-0.15	0.46	-0.86
311	Transurethral procedure, age < 70 without complications or comorbidities	0.41	0.65	0.16
320	Kidney and urinary tract infections, age > = 70 and/or complications or comorbidities	-0.81	-2.07	0.61
321	Kidney and urinary tract infections age 18-69 without complications or comorbidities	0.75	1.04	0.44
322	Kidney & urinary tract infections, age 0-17	0.00	0.01	-0.01
328	Urethral stricture, age > 70 and/or complications or comorbidities	0.39	0.67	0.08
329	Urethral stricture, age 18-69 without complications or comorbidities	0.20	0.36	0.02
336	Transurethral prostatectomy, age > = 70 and/or complications or comorbidities	-0.21	-0.17	-0.31
337	Transurethral prostatectomy, age < 70 without complications or comorbidities	0.62	0.91	0.31
342	Circumcision, age > = 18	0.26	0.63	-0.16
359	Tubal interruption for nonmalignancy	0.01	0.02	0.00
361	Laparoscopy and endoscopy (female) except tubal interruption	0.05	0.06	0.06
362	Laparoscopic tubal interruption	0.02	0.05	-0.01
364	Dilation and curettage, conization, except malignancy	1.00	1.47	0.47
410	Chemotherapy	-7.19	-10.41	-3.57
412	History of malignancy, with endoscopy	0.91	1.14	0.64

SOURCE: The Rand Corporation: Analysis of calendar year 1981 MEDPAR and fiscal year 1984 PATBILL files.

In analyzing the contribution that changes in the proportion of discharges in these DRG's made to the overall CMI increase, we found that DRG 39 (lens procedures) had to be analyzed separately. It accounts for such a large proportion of Medicare discharges and has experienced such large changes over time that it tends to dominate the other 36 DRG's on the list. To a lesser extent, DRG 410 (chemotherapy) is also worthy of separate analysis.

Over time, the other 35 DRG's have fallen as a percent of Medicare discharges. Because the resource needs of such patients (as reflected in DRG weights) are much lower than average, this decline has contributed to the increase in the CMI. We estimate that these 35 DRG's account for 15 percent of the trend in the CMI prior to the prospective payment system (PPS). The relative decline in the proportion of discharges in these DRG's accelerated somewhat during PPS, but this accounted for only 1 percent of the shift in the CMI associated with the PPS.

The fact that discharges in these DRG's did not increase during the first year of the PPS must be highly encouraging to HCFA. If the incentives of per case payment were to increase the admission rate, these DRG's would be prime candidates. Either the incentives have turned out not to be as strong as had been commonly predicted or other forces—such as PRO review, technological change, or changes in physician attitudes—have predominated.

The pattern for lens procedures is quite different. During the pre-PPS period, the number of discharges in DRG 39 increased substantially—from 3.62 percent of Medicare discharges in calendar year 1981 to 3.95 percent in fiscal year 1983. This tended to reduce the

CMI, offsetting the increase from other DRG's.

In 1984, however, this was reversed, with discharges declining to 3.52 percent of Medicare discharges. This departure from the previous trend accounted for 19 percent of the increase in the CMI associated with PPS.

Because hospitals regard the reimbursement for DRG 39 under PPS as too low,[17] PPS may have encouraged them to shift the procedures to their outpatient departments, where reimbursement is still on the basis of incurred costs. Discouragement of inpatient lens procedures by PRO's may also have contributed to this shift.

DRG 410 grew more rapidly than other DRG's prior to PPS, slowing the increase in the CMI from what it otherwise had been. During PPS, this rapid growth accelerated, thus keeping the PPS shift smaller than it otherwise would have been.

Confirmation with cross-section data

Because the above DRG-level analysis was based on a time series model, with the observations aggregated over all hospitals in nonwaiver States, there is a risk of confounding the effects of PPS with those of a technological change that happened to coincide with the program. Such a confounding would require a very rapid diffusion of the change, but the possibility cannot be ruled out with time series data.[18]

In order to reduce the chance of incorrectly identifying a technological or other change as a PPS effect, we compared the proportion of discharges in a given DRG in hospitals on PPS with that in hospitals not yet on PPS. We used hospital-level data from PATBILL for discharges in fiscal year 1984.

For each of the 15 DRG's with the largest contributon to the PPS shift, we estimated a regression explaining the proportion of discharges in fiscal year 1984 classified into that DRG.[19] The independent variables were those on hospital characteristics (Table 7), and a variable for the proportion of months in fiscal year 1984 that the hospital was on PPS. The regression was weighted by the number of Medicare discharges, so that large hospitals had a larger influence on the regression.

Where the time series analysis showed that the proportion of discharges in a DRG increased with PPS, we would expect to find that hospitals with more months on PPS would have higher proportions of discharges in that DRG. Table 11 summarizes the results of these regressions. Of the 15 DRG's, all of the coefficients have the predicted sign and all but 1 are statistically significant. This provides strong confirmation that our identification of PPS effects was not confounded by technological change.

The one DRG without a statistically significant coefficient is DRG 39 (lens procedures). The uncertain confirmation of the time series results for DRG 39 may indicate that technological change and/or increased utilization review efforts by the PRO's may have been more of a factor than PPS in shifting cataract surgery to outpatient settings. Because this study treated the shift in DRG 39 as a medical practice change, the doubt that the shift was induced by PPS does not alter our conclusions about the role of coding changes in the CMI increase.

Conclusions

Here we will organize the results presented to answer the question of how much of the 9.2-percent increase in the case-mix index is the result of changes in medical practice, aging of the Medicare population, and documentation and coding practices. We will then discuss the policy implications of these results.

Recapitulation of results

Medical practice changes accounted for a small portion—2.0 percentage points—of the overall increase in the case-mix index (CMI). As shown in Table 12, that figure has two distinct components. The trend in the CMI prior to the prospective payment system (PPS), which we attribute to medical practice changes, accounts for 1.4 percentage points (0.50 percent per year for 2.75 years). The sharp departure from trend in the proportion of admissions for lens procedures accounts for 0.7 percentage points. This was computed by taking 19 percent of the 3.5-percentage point increase in the CMI attributed to PPS by the regression models.

Aging of the population of Medicare inpatients did not contribute to the increase in the CMI over this period, and it is unlikely to in the immediate future.

The remainder of the CMI increase—7.0 percentage points—is attributed to documentation and coding. This consists of 2.8 pcercentage points for the effects of PPS-induced coding changes and 4.0 percentage points for the inconsistencies beteween the 1981 MEDPAR data base and the 1984 PATBILL data base.

The estimate for PPS-induced coding changes comes from the regression models estimated on the Medicare and Professional Activity System (PAS) data bases, respectively. From the Medicare analysis, a 3.3-percent increase in the CMI was associated with PPS. From the PAS analysis, a 3.5-percent increase was calculated. Because the estimates from the regressions on the Medicare data base may be too low because of the inability to measure an anticipatory effect, we have used the slightly higher result from the PAS analysis.

The estimate of PPS-induced coding changes is a 2.8-percentage point impact on the CMI, instead of a

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[17] See, for example, the appendix to the report of the Prospective Payment Assessment Commission (1985). In the recalibration of DRG weights for 1986, HCFA increased the weight of DRG 39 from 0.50 to 0.58—a 14-percent increase relative to other DRG's.

[18] In contrast to the hospital-level analysis, the DRG-level file does not include information on the timing of hospitals' entry into PPS. Thus, no control group is available.

[19] The 15 DRG's accounted for 93.5 percent of the PPS shift.

Table 11

Cross-section analysis of the 15 most important diagnosis-related groups, by proportion of Medicare discharges in hospitals on prospective payment system: Fiscal year 1984

Diagnosis-related group		Proportion of discharges		
		Hypothesis[1]	Coefficient (x100)	Significance level
39	Lens procedures	–	–.22	.3
121	Circulatory disorders with acute myocardial infarction and cardiovascular complications discharged alive	+	.29	.0001
108	Cardiothoracic procedures, except valve and coronary bypass, with pump	+	.03	.03
209	Major joint procedures	+	.20	.0002
148	Major small and large bowel procedures age > = 70 and/or complications or comorbidities	+	.17	.0001
182	Esophagitis, gastroenteritis, and miscellaneous digestive disorders age > = 70 and/or complications or comorbidities	–	–.17	.02
87	Pulmonary edema and respiratory failure	+	.22	.0001
210	Hip and femur procedures except major joint age > = 70 and/or complications or comorbidities	+	.03	.0001
79	Respiratory infections and inflamations age > = 70 and/or complications or comorbidities	+	.16	.0001
124	Circulatory disorders except acute myocardial infarction, with cardiac catheter and complex diagnosis	+	.16	.0001
110	Major reconstructive vascular procedures age > = 70 and/or complications or comorbidities	+	.09	.0001
132	Atherosclerosis age = 70 and/or complications or comorbidities	–	–.55	.0001
134	Hypertension	–	–.17	.0001
416	Septecemia age > = 18	+	.18	.0001
183	Esophagitis, gastroenteritis and miscellaneous digestive disorder age 18-69 without complications or comorbidities	–	–.15	.0001

[1] The hypothesis is the sign of the coefficient expected on the basis of the results of the time series analysis.

NOTES: Other independent variables were teaching status, ownership, bed size, census division, and urban or rural location. See Table 8 for details. DRG's were ranked according to the absolute value of their contribution to the fiscal year 1984 shift.

SOURCE: The Rand Corporation: Analysis of fiscal year 1984 PATBILL file.

Table 12

Decomposition of case-mix index increase, by selected variables: 1981-84

Variable	Percent change
Calendar year 1981—fiscal year 1984	
Case-mix index increase	9.2
Medical practice changes:	
Total	2.0
Trend prior to prospective payment system	1.4
Shifts to outpatient associated with prospective payment system	0.6
Setting for lens procedures	0.7
Setting for chemotherapy	–0.1
Other outpatient substitution	0.1
Older patients	
Coding practice changes:	
Total	7.0
Induced by prospective payment system	2.8
MEDPAR or PATBILL inconsistency	4.0

NOTE: Numbers are multiplicative instead of additive; for example, 1.028 x 1.040 = 1.070.

3.5-percentage point impact, because 0.6 percentage point of the PPS effect reflects shifts in outpatient substitution—medical practice change.

The effect of data base inconsistencies is calculated as a residual. The 4.0-percentage point contribution is that component of the 9.2-percent increase not explained by other factors.[20]

If we look at the change in Medicare/CPHA differences in the CMI over time, the direct method produces an estimate of 2.1 percent. The residual is much closer to the original estimate of 3.4 percent developed by the Medicare Actuary on the basis of a comparison of MEDPAR with data for 1981 collected by the professional standard review organization.

Policy implications

The two critical findings from this study that relate to policy are the following:

- Much of the increase in the CMI between calendar year 1981 and fiscal year 1984 is related to changes in coding practices on the part of hospitals and in data collection procedures on the part of HCFA.
- The increase in the CMI may be a one-time adjustment to the new reimbursement environment.

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[20] Originally, we had hoped to estimate this directly by comparing the 1981 MEDPAR CMI with the 1981 PAS CMI for PAS hospitals. We made this comparison, and calculated a 5.2 percent difference. As a check, we made the same comparison for 1984, and instead of finding a negligible difference, we calculated a 3.0 difference. We still do not understand why Medicare's data system and the CPHA data system should indicate such different CMI's for the same hospitals in 1984; for that reason, we prefer calculating the component as a residual.

The first finding supports action by HCFA to offset the component of the increase beyond that projected by the Medicare Actuary. This is not as straightforward as may appear, however, as HCFA may want to treat differently increases resulting from coding and data collection procedures beyond what the Actuary projected versus increases resulting from medical practice changes that exceeded what the Actuary had assumed for that component.

The first finding does not call into question the integrity of the DRG system and those participating in it. An increase in the CMI had been predicted, but with little objective data to estimate the magnitude of the increase. The estimate turned out to be too low. The experience to date is not inconsistent with legitimate improvements in the accuracy of coding practices.

The second finding—that the CMI increase appears to be a one-time adjustment—is a very tentative one, because it is based on only two quarters of experience. If additional experience shows this to be the case, it will give encouragement to those counting on classification on the basis of DRG's to have more than short-term usefulness. If "DRG creep" instead turns out to be more than a one-time adjustment, but a continuing phenomenon, the usefulness of DRG classification is called into question. Although Medicare could protect itself from higher-than-expected payments per case by adjusting the following year's rates, inequities between those hospitals with the largest "creep" and others might become intolerable. As noted above, preliminary analysis of additional data reduces our optimism about this possibility. The second half of fiscal year 1985 showed substantial increases in the CMI, although an important part of the increase represents changes in medical practice, particularly shifts in cataract surgery to outpatient settings.

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Setting health maintenance organization capitation rates for Medicaid in Wisconsin

by William L. England

In late fall 1984, more than 110,000 Wisconsin Aid to Families with Dependent Children (AFDC) Medicaid recipients were enrolled in health maintenance organizations (HMO's). Capitation rates were set by competitive bidding, subject to a rate ceiling. Planners considered whether to adjust the rates to account for demographic changes in the AFDC population between the time that data for the rate ceilings were collected and when the rates went into effect. They also considered whether to pay a single rate or to adjust rates for the age and sex of each HMO's actual enrollees. This article is a report of the analysis that led to a decision to pay a single, countywide rate that was not demographically adjusted.

Introduction

Since late fall 1984, the Wisconsin State government has enrolled more than 110,000 Aid to Families with Dependent Children (AFDC) Medicaid recipients in health maintenance organizations (HMO's) in the State's two most populous counties. As a result, Wisconsin's prepaid AFDC population has become one of the largest in the Nation. Other large prepaid programs include those of California—about 225,000 total medical assistance, with about 90 percent being AFDC; Arizona—161,000 total and about 49 percent AFDC; and Michigan—93,000 AFDC (Medicaid program administrators, 1985). Only AFDC recipients were initially enrolled in the Wisconsin program because they represent the least costly, least risky component of the Medicaid population and are the group initially targeted for Medicaid HMO programs in most States. It is planned to later include in the program recipients of Aid to the Totally Disabled and Aid to the Blind.

In October 1984, the State government of Wisconsin began paying each HMO in the program a single per-person rate that was contract negotiated. HMO's bid competitively on rates, with the lowest bidders getting the largest share of the enrollees according to a formula that will later be discussed. In negotiating new rates for 1986, State planners considered whether to provide adjustments in the rates to allow for demographic shifts in the age-sex distribution of the AFDC population between the time the cost data were collected and the time that the rates went into effect. Similar adjustments could be made to account for differences in the age and sex of the AFDC populations actually enrolled in each HMO instead of paying a single per-person rate to each HMO. A decision was made to continue paying each HMO a single contract-negotiated per-person rate that was not demographically adjusted. The analysis that led to that decision, in which data from approximately the first 6 months of the program were used, is reported in this article.

Calculation of capitation rates

Three issues were considered in determining how to set the 1986 capitation rates. The first issue was the competitive bidding process used to set the 1985 rates and its effect on the actual rates paid to HMO's. The second issue was the effect of a demographic shift in the AFDC population from 1983, when the data on which the rates were based were collected, to 1985, when the rates were applied. The third issue was the effect on individual HMO's of paying a rate adjusted for the actual age-sex distribution of their enrollees rather than paying a single per-person rate.

Competitive bidding process

In midsummer 1984, data were available on the 1983 AFDC fee-for-service charges paid by the Wisconsin State government. These data were classified by age, sex, and county. Data were also available on the number of AFDC eligibles each month, classified by age, sex, and county. Dividing the total of the former by the total of the latter gave the per-person-month fee-for-service cost to the State government for AFDC recipients in 1983. Statewide, this average was $56.72.

Dane and Milwaukee Counties, the most populous in the State, are the subject of this analysis. Dane County's 1980 population was 323,545. Its largest city is Madison (population 170,616), the State capital. Milwaukee County's 1980 population was 964,988. Its largest city is Milwaukee (population 636,212). The average fee-for-service cost per person-month was $51.07 in Dane County and $68.36 in Milwaukee County.

These fee-for-service figures were increased by 3 percent per year to account for health care cost increases from 1983 to 1985. (In consideration of inflation and other factors, the State legislature had previously set the 3-percent factor to use for medical assistance fee-for-service provider payment increases.) An amount of $1.50 was next added to adjust for the cost of State government claims processing under the fee-for-service system. (It has been found, however, that the $1.50 amount is going into other expenses of the State government for administering the HMO program and is not being saved.) Finally, $0.14 was

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subtracted from the total to compensate for the decrease in Medicaid copayment revenue for the State government. The totals were multiplied by .95 for Dane County (reflecting a 5-percent discount from the expected fee-for-service average cost for 1985) and by .93 for Milwaukee County (a 7-percent discount). The resulting rates were $52.76 for Dane County and $68.70 for Milwaukee. These were the "bid ceilings" for HMO contracts with the State government. (If a statewide bid ceiling had been calculated, it would have been $57.23.)

These discounts of 5 percent and 7 percent are similar to discounts used in several other States. Because this was the first year of a major new program for which the State government and the HMO's had no experience, the discounts were somewhat conservative. In comparison, the Michigan government currently uses a discount of 10 percent, but started their program in 1976 with a discount of 2 percent. The Minnesota government used a 15-percent discount until July 1983 but now uses 10 percent. The discount of 5 percent currently used in Illinois may be increased. The California rate has varied from 0 percent to 17 percent since the program began in 1972. The current California rate is based on the minimum of the actual experience of HMO's with their enrolled population during the previous year or on the fee-for-service cost of an equivalent population. In a bidding process similar to Wisconsin's, the Arizona government set 1985 rates equal to or below the April 1, 1984, fee-for-service rates. In New York, roughly the equivalent of a 5-percent discount is used. (Information on specific State discounts comes from Medicaid program administrators, 1985, and from Leighton, 1978.)

In Wisconsin, a larger discount was used for Milwaukee County than for Dane County because the 1983 average fee-for-service costs in Milwaukee County were considerably (21 percent) higher than the statewide fee-for-service average. Thus, greater savings through the use of HMO's were expected than in Dane County, where the fee-for-service average was 10 percent below the statewide average.

To contract with the State government for provision of health care services, HMO's were required to submit bids by October 1, 1984. The bids specified a per-person-month rate to be paid the HMO for AFDC enrollees in the last few months of 1984 and all of 1985. HMO's were given the bid ceilings of $52.76 in Dane County and $68.70 in Milwaukee County. Subtractions from the bid ceiling were made if an HMO did not offer dental or chiropractic services or if it wished to have coinsurance by the State government for patients exceeding either a $10,000 or a $25,000 limit in annual hospital charges. These subtractions were equal to the expected cost of covering these services on a fee-for-service basis, discounted by 5 percent in Dane County and 7 percent in Milwaukee County. In Dane County, 5 of 5 HMO's bid on the contract. In Milwaukee County, 8 of 10 HMO's bid. Of these 13 HMO's, 8 bid under the ceiling. All the bids were accepted, and no further negotiations took place.

AFDC eligibles were given their choice of HMO. Persons who did not specify their choice within a 4-month voluntary enrollment period were assigned to an HMO. However, patients may switch to a new HMO if they are dissatisfied. (The issue of quality of care in the HMO system versus the fee-for-service system is assessed in Dunham, Noren, and Liss, 1984.)

Patients were assigned to HMO's proportionally to the amount by which each HMO underbid the rate ceiling. This proportion was calculated by taking the total dollar amount of underbidding in each county, calculating the percent of the total attributable to each HMO, and assigning that percent of the unassigned patients to the HMO. Most HMO's specified the maximum AFDC enrollment they wished to accept. Three HMO's in Milwaukee exceeded this limit when patients initially signed up. Although these HMO's had underbid the rate ceiling, no unassigned patients were assigned to them because of overenrollment. Unassigned patients were assigned proportionally to the remaining underbidders.

By mid-April 1985, 13 percent of AFDC-eligible participants had been assigned to an HMO, and fully three-quarters (75.5 percent) had voluntarily selected one. The high level of voluntary enrollment, which exceeded expectations, is thought to have occurred because of extensive advertising by the HMO's. Advertising created a strong public awareness, and people apparently perceived differences among HMO's and preferred not to be assigned to one by the State government.

Such extensive advertising is most likely attributable to the very competitive HMO market in Wisconsin. The number and size of HMO's in Wisconsin have grown rapidly in recent years because of an excellent HMO option offered to about 51,000 State government employees. Around 38,000 State employees currently belong to an HMO (*Milwaukee State Journal*, 1985), and a majority of them live in Dane County. In addition, many local employers now offer an HMO option.

In 1983, the State government announced that the AFDC populations in Dane and Milwaukee Counties would soon be enrolled in HMO's. Coupled with the rapid increase in popularity of the HMO option among State employees, this announcement probably encouraged several groups that were thinking about starting HMO's to move rapidly to capitalize on both the State employee and AFDC markets. These factors have resulted in a proliferation of new HMO's that are very competitive for patients.

HMO advertising was partly directed toward State government employees, who are allowed to join or switch HMO's once each year in the fall. However, in Milwaukee County, where 91.7 percent of the AFDC eligibles in this program are located, the advertising was mostly directed toward the AFDC population.

Data on participating HMO's by county are shown in Table 1. Data on HMO's are shown in the first four columns by type of plan, AFDC enrollment in April 1985 (approximately 6 months into the program), specified maximum AFDC enrollment, and "actual" contract rate. "Actual" rates are the result of adjustment to reflect the fact that some HMO's do not cover all services and/or elected a risk-sharing option. For example, if an HMO's bid did not include dental coverage, the actual rate shown in Table 1 is larger than the bid by an amount that reflects the government's average cost of providing fee-for-service dental coverage to patients in that HMO ($2.25 in Dane County and $2.34 in Milwaukee County). The same is true for chiropractic coverage ($.55 in Dane, $.06 in Milwaukee) and risk sharing ($1.79 in Dane and $3.29 in Milwaukee for $10,000; $1.04 in Dane and $1.85 in Milwaukee for $25,000). Therefore, the rates in Table 1 are equivalent to rates the HMO's would have had if they offered full dental and chiropractic coverage and no risk sharing. The actual rates can be directly compared with each other and with the maximum rate for each county, and they represent the actual cost to the State government of an AFDC recipient enrolled in that HMO.

Multiplying the enrollment of each HMO by its actual contract rate and adding all HMO payments together gives a figure of $7,053,767. This is the monthly amount paid by the State government for HMO-enrolled AFDC recipients in these two counties in April 1985. If each HMO had bid at the maximum rate ($52.76 in Dane County and $68.70 in Milwaukee County), an additional $109,754 per month ($1.31 million annually) would have been paid. Thus, the bidding process can be estimated to have saved the State government at least $1.31 million in 1985. Compared with the expected fee-for-service costs for 1985 (1983 costs increased by 3 percent per year), an estimated $5.94 million was saved annually on health care for AFDC recipients in these two counties. However, because the expected claims processing savings of $1.50 per recipient are not being achieved, this estimate must be reduced to $4.16 million.

State government perspective

Since 1983, AFDC enrollment in Dane and Milwaukee Counties has shifted toward a younger population and one that contains fewer females of childbearing age. Therefore, the 1985 population is less expensive to care for than the 1983 population on which costs were based. The magnitude of this effect was measured by recalculating the bid ceilings to adjust for these demographic changes. The AFDC population was divided into 10 age categories for each sex, or 20 age-sex groups. These breakdowns were used for this analysis because they were previously used for collecting 1983 fee-for-service data. Subsequently, it is shown that a smaller number of groups would be sufficient.

The total 1983 fee-for-service charge for each age-sex group was divided by the person-months of eligibility recorded for that group. The resulting quotient was updated twice by 3 percent, $1.50 was added, and $.14 was subtracted. The result was then

Table 1

Statistics of health maintenance organizations (HMO's), by county and HMO: Wisconsin, April 1985

County and HMO	Type of HMO[1] (1)	Enrollment (2)	Enrollment limit (3)	Actual rate[2] (4)	Age-sex adjusted rate (5)	Percent of age-sex-adjusted rate/county (6)
Dane County						
Total		8,803	—	[3]$52.29	[3]$51.33	—
1	Group	1,543	3,000	52.34	51.13	-.39
2	Group	3,108	none	52.76	52.46	2.20
3	IPA	1,923	none	51.34	51.54	.41
4	IPA	497	1,200	52.76	50.78	-1.07
5	Staff	1,732	4,000	52.34	49.42	-3.72
Milwaukee County						
Total		97,512	—	[3]67.62	[3]67.73	—
6	IPA	6,674	27,000	68.70	68.85	1.65
7	Staff	739	2,000	68.70	68.46	1.08
8	IPA	7,314	15,800	68.39	67.42	-.46
9	IPA	5,893	20,000	68.70	69.19	2.16
10	Group	9,184	13,300	67.15	67.97	.35
11	IPA	[4]19,410	10,000	67.96	67.35	-.56
12	IPA	[4]17,535	10,000	68.33	67.93	.30
13	IPA	[4]30,763	29,250	66.48	67.32	-.61

[1] A staff HMO employs physicians on salary. An independent practice association (IPA) has independent physicians banded together under a middleman organization. A group HMO has physician group practices contracted with the HMO to provide health care to HMO members.

[2] If the HMO elected risk sharing or does not cover dental or chiropractic services, these rates include the cost to the State government of covering those services plus the actual contract rate paid to the HMO.

[3] Weighted average by enrollment of each HMO in the county.

[4] Overenrolled from voluntary patient enrollment preferences.

Table 2

Rate ceilings for health maintenance organizations, by county, sex, and age: Wisconsin, April 1985

	Entire State		Dane County		Milwaukee County	
Age	Male	Female	Male	Female	Male	Female
Average for all ages	$40.21	$68.67	$34.96	$63.92	$45.90	$82.57
Under 1 year	129.77	[1]232.13	93.67	[1]222.91	145.71	[1]275.19
1-4 years	32.23	25.82	28.03	24.09	39.89	29.94
5-9 years	24.14	19.92	21.51	20.20	28.02	21.63
10-14 years	26.30	26.00	21.68	26.66	30.36	28.62
15-19 years	34.27	84.33	31.63	79.49	36.90	100.32
20-24 years	36.67	96.68	41.37	85.72	46.69	116.47
25-34 years	44.98	86.01	47.16	76.27	61.13	109.01
35-44 years	62.82	88.79	66.05	90.10	80.65	117.99
45-54 years	87.80	107.47	66.52	65.79	110.00	130.45
55 years or over	100.73	121.84	64.54	44.37	148.45	127.89

[1] See discussion of female infant rates in "Data anomalies and sensitivity analysis" section of article

multiplied by .95 (Dane) or .93 (Milwaukee) to arrive at the "rate ceiling" for each age-sex group. The results are shown in Table 2. These figures were multiplied by the percent of AFDC eligibles in each age-sex group in April 1985 to obtain an age-sex-adjusted rate ceiling for each county that accounts for shifts in the demographics of the AFDC population from 1983 to 1985.

The result would have been a rate ceiling of $51.43 for Dane County (compared with the figure of $52.76 actually used) and $67.70 for Milwaukee County (compared with the figure of $68.70 actually used). Multiplying the ratios $51.43/$52.76 by .0828 (the percent of enrollees in Dane County) and $67.70/$68.70 by .9172 (the percent of enrollees in Milwaukee County) gives .9846. Thus, the current population is only 98.46 percent as expensive, demographically, as the 1983 population. Comparing these adjusted rate ceilings with the actual average contract rates from Table 1 shows that the average contract rate in Dane County is $.86 more per month than this adjusted rate ceiling ($51.43 compared with $52.29), and the average contract rate in Milwaukee County is 8 cents less ($67.70 compared with $67.62). Because Milwaukee County comprises most of the total population, the net result is that the State government pays slightly less per month under the current rates than it would have paid if these age-sex-adjusted nonbid rates were used. However, if age-sex-adjusted rates had been used as the ceilings in the bidding process, the bids might have been lower. The government would have saved from the age-sex shift in the AFDC population from 1983 to 1985 while still potentially benefiting from HMO underbidding of the rate ceilings.

A problem with making demographic adjustments in the rate ceilings is that the demographics of the AFDC population change monthly. A shift in the population could occur between the time the bidding took place and the time the rates went into effect. To accurately make age-sex adjustments in the rates, it would be necessary to calculate a separate rate ceiling for each age-sex group. HMO's could then bid a percentage factor to be applied equally to each group. For example, if an HMO bid 98 percent, it would be paid 98 percent of the rate ceiling for each age-sex group, multiplied by the number of its enrollees in that age-sex group. Both government and HMO recordkeeping would become more complicated than it is under the system of having a single per-person rate. The question of how to deal with noncovered services (such as dental or chiropractic services) would also present an unresolved complication.

To estimate the effect such a scheme might have had on the 1985 capitation rates, a "percentage bid factor" for each HMO was hypothesized. The percentage bid factor equals the rate ceiling in each county divided by the actual adjusted contract rate for the HMO. For example, HMO 1 would have a percentage bid factor of 51.13/52.76 = .969 applied to the rate ceiling of each age-sex group. Applying this calculation to all HMO's would result in savings to the State government of $105,273 per month ($1.26 million per year) of the $7,053,767 per month currently being paid. Of course, this is only hypothetical. HMO's might have bid more conservatively if the rate ceilings had been lower. However, given that HMO's could not have known in which direction (in terms of cost) demographic shifts would move from 1983 to 1985, their bidding might not have been much different under such an age-sex-adjusted rate scheme.

Although a demographic shift toward a lower cost population took place from 1983 to 1985, regression toward a more expensive population would be expected in the future (Welch, 1984). Thus, in the long run, there would be little advantage to the State government in using the previously discussed capitation scheme, which adjusted rates to match the actual enrolled population.

However, a case for age-sex adjustment could be made if the adjustments were made to compensate for selection bias between the 1983 AFDC population and the 1985 enrolled population. Such a bias could occur if capitation rates were based on the entire 1983 AFDC-eligible populations in Dane and Milwaukee Counties, but less than 100 percent of the population actually enrolled in HMO's.

The preceding adjustments have addressed only age and sex biases in the enrolled population. This is primarily because these are easy variables to measure and adjust for, and they were readily available for the 1983 fee-for-service population on which rates were based. Beebe, Lubitz, and Eggers (1985) have shown that among Medicare HMO enrollees, a rate adjustment for health status, particularly prior hospital use, is also an important variable for rate adjustment.

Prior to implementation of this program, planners were concerned that the most expensive patients (women of childbearing age and older patients) might be least likely to voluntarily enroll. This would mean that, during the first 8- to 10-month implementation stage, until most of the eligible population was enrolled, payments to HMO's would be higher than they should be. Instead, based on their age and sex, the average capitation rate for the 1,229 Dane County eligibles not yet enrolled in April 1985 would be only $.79 more per patient-month than the rate for those already enrolled ($52.12 versus $51.33). In Milwaukee County, the 12,528 patients not yet enrolled would average $.26 per patient-month less than those already enrolled ($67.47 versus $67.73). It is assumed that this result is attributable to the intense advertising of HMO's, which gave them high visibility and made AFDC eligibles eager to select an HMO before they were assigned to one.

Because the goal in Wisconsin was to enroll the entire AFDC populations of Dane and Milwaukee Counties in HMO's, self-selection was an issue only until the government enrolled the entire population. By mid-August 1985, enrollment had reached 96 percent, and it is expected to remain near that level. (New AFDC eligibles take a month or two to get enrolled in an HMO, during which time they are covered by the fee-for-service system.)

HMO perspective

The benefit of age-sex adjustment of capitation rates is different from the HMO's perspective than from the State government's perspective. As it turns out, HMO's enrolled a population only 98.5 percent as expensive, in terms of their age and sex distribution, as the 1983 population on which the rate ceilings were based. If, however, the demographic shift from 1983 to 1985 had been toward a more expensive population and HMO's had underbid the rate ceilings, then the government would have profited from both the underbidding and the demographic shift and would have realized more than its 5 percent and 7 percent savings goals. Without age-sex adjustment of rates, such a negative shift could have resulted in a significant financial strain on some HMO's, depending on how large a share of their total enrollment AFDC patients represented. (By law, the percentage cannot exceed 75 percent unless waived by the Federal Government.) Under any circumstances, age-sex adjusted rates would probably most benefit smaller HMO's, for which a numerically small AFDC enrollment could represent a larger percentage of their total enrollment and make them more subject to financial difficulties in the event of a negative demographic shift.

Thus, the question remains: Would age-sex adjustment of capitation rates to match the population on which rates are based to the current population benefit HMO's? Such an adjustment could spare HMO's the effect of a negative demographic shift in future years, but it would also prevent them from benefiting from a shift toward a lower cost population, such as is currently happening in Wisconsin. (The HMO's are not actually profiting from the shift in 1985, but in effect it compensated for their underbidding of the rate ceilings.) The general feeling of State planners and the HMO's at the time of negotiations for the 1986-87 contract seemed to be that, because a demographic shift is a transient phenomenon, there is little reason to adjust for it.

A second type of age-sex adjustment of capitation rates that might benefit HMO's is adjustment of each HMO's actual rates according to the age-sex distribution of the population actually enrolled in the HMO. Such a system could offset factors, such as location, reputation, advertising, and benefits package, which might cause variations from the norm in individual HMO populations. For example, if one HMO enrolled a population that was younger and/or contained fewer females of childbearing age, a rate structure that was not age-sex adjusted would benefit that HMO at the expense of others. Although the total government payments would be the same, some HMO's would receive more than their appropriate share of payments, and some would receive less. By providing age-sex adjusted rates that matched their actual enrolled AFDC populations, the risk of adverse selection for each HMO would be lowered slightly. HMO's might be expected to accept slightly lower capitation rates to achieve this benefit.

To calculate the potential amount of financial variation attributable to nonhomogeneous age-sex distribution of enrollees among HMO's, an age-sex-adjusted rate was obtained for each HMO. The rate was calculated by multiplying the percent of actual AFDC enrollees in each age-sex group of each HMO by the rate ceilings for each age-sex group shown in Table 2. The resulting adjusted rates are shown in column 5 of Table 1. Age-sex-adjusted rates were compared with the average for each HMO for each county. (County averages were $51.33 for Dane and $67.73 for Milwaukee.) This shows how each HMO's AFDC population differed in expected cost (based on age-sex distribution) with respect to the county average. The percent differences between each HMO's adjusted rate and the county average are given in column 6 of Table 1.

Column 6 shows that two HMO's have populations that are potentially 2.2 percent more expensive than the county average, and one HMO has a population that is potentially 3.7 percent less expensive than the county average. For an HMO operating in a very competitive environment on a relatively tight budget, enrolling a population which is only a small amount more expensive than the average could be a problem. However, the possibility of profiting from a biased selection, such as may be happening with the HMO having an expected cost 3.7 percent below the average, might cause HMO's to prefer to gamble on benefiting from biased selection. Again, age-sex-adjusted rates would probably most benefit smaller HMO's, for which larger percentage variations from the norm would statistically be expected.

Data anomalies and sensitivity analysis

A potential problem noted in the fee-for-service data used in this study is that charges recorded for females under 1 year of age were over twice the amount of charges per infant recorded for males. It is suspected that this is partly attributable to some maternal care being incorrectly charged to female infants rather than to their mothers on the AFDC billings. Such an error might occur if the sex were recorded as female and the birth date of the infant were recorded rather than the birth date of the mother.

To investigate the effect of this potential error, the data were adjusted in such a way that female infants cost the same as male infants. The additional charges for female infants were allocated to women 15-44 years of age in proportion to the distribution of births to women in those age groups as calculated from birth rate data for U.S. women 15-44 years of age (National Center for Health Statistics, 1985). Rates for the various age groups were: 15-19 years, 14.6 percent; 20-24 years, 30.9 percent; 25-34 years, 47.9 percent; 35-44 years, 6.6 percent. This adjustment results in a total age-sex-adjusted payment for both counties of $33,431 more per month. Therefore, the effect of such an error in recording infant and maternal age is to make an age-sex-adjusted system somewhat less beneficial.

Another concern in calculating age-sex-adjusted payments is the effect of small sample size in some age-sex groups. For example, only 185 person-months of fee-for-service coverage were reported for AFDC males 55 years of age or over in Dane County in 1983. Is this amount of data sufficient to be the basis of a capitation rate? An alternative for small age-sex groups would be to use the statewide AFDC fee-for-service average in that category and adjust it by the ratio of average county costs to average State costs. (These ratios would be $51.07/$56.72 = .9004 for Dane County and $68.36/$56.72 = 1.2052 for Milwaukee County using 1983 data.) If 1,000 were used as the minimum group size on which to base calculations, 3 of the 20 age-sex groups in Dane County would be based on statewide averages. This would have decreased the State government's total monthly payments (under an age-sex-adjusted scheme) by less than .1 percent. If 10,000 were the minimum group size, 14 groups in Dane County and 4 in Milwaukee would be based on statewide averages, but the total payment would change by less than .02 percent. These findings suggest that concern for small group size is probably unnecessary in that it has a negligible effect on the total government payment.

Another way to minimize the effect of small group size would be to use fewer groups. In these calculations, 10 age group were used because fee-for-service data in Wisconsin are collected according to these groups. In Michigan, only 6 groups are used (under 1 year, 1-4 years, 5-14 years, 15-20 years, 21-44 years, and 45 years or over for each sex). In Minnesota, 4 groups are used (both sexes under 15 years, males 15-49 years, females 15-49 years, both sexes 50 years or over). In New York, a total of 10 groups are used. The Illinois program does not adjust by age or sex but is considering doing so in the future (Medicaid program administrators, 1985; Levine, 1984). The calculation of this analysis were refigured using only 6 age groups (under 1 year, 1-4 years, 5-14 years, 15-24 years, 25-44 years, 45 years or over) for each sex, and that it made a difference of only a small fraction of 1 percent in any of the results. Thus, calculation of capitation rates for more than 6 age groups is probably unnecessary.

Conclusions

The purpose of this research was to consider the effect of the bidding process and age-sex adjustment of capitation rates for prepaid health care for AFDC eligibles in Wisconsin. Based on this analysis, it is estimated that the present prepaid health care program for AFDC eligibles in Dane and Milwaukee Counties saves the State government at least $4 million per year compared with the expected fee-for-service costs. These savings should continue in the future.

It was decided, based on findings from this analysis, that the difficulties of implementing a system for age-sex adjustment of capitation rates exceeded the potential savings to the government that could be realized by the system. The primary beneficiaries of such a rate-calculation method would be HMO's. However, it was doubted that HMO's would accept a rate concession for implementation of such a system. Therefore, the idea was not pursued in the 1986 rate negotiations.

Providing an incentive for HMO's to underbid the rate ceilings to increase their patient base was found to have a significant effect on the cost of the program. Thus, the rate-setting procedure for 1986 followed the same plan as for 1985. A countywide AFDC per-person average for 1984 was calculated and adjusted to form a bid ceiling for the 1986 rates. HMO's then bid at or below this ceiling. New AFDC eligibles who do not specify which HMO they wish to join are again proportionally assigned to the HMO's that bid under the rate ceiling.

During most of 1984, the AFDC populations of Dane and Milwaukee Counties were still covered under the fee-for-service system. In future years, these rate-setting mechanisms will not be possible because almost all AFDC eligibles will already be enrolled in HMO's and fee-for-service averages will not be not be available. Future capitation rates may thus have to be calculated on statewide AFDC averages (excluding Dane and Milwaukee Counties) and adjusted by some factor to account for differences between the State and the two counties. As noted previously, these would have been .9004 for Dane County and 1.2052 for Milwaukee County in 1983. Individual factors for each age-sex group in each county could also be used. Alternatively, the most recent (1984) fee-for-service averages could be adjusted for inflation and used for 1987 and future rates. At this time, it is not certain how future rates will be set.

Ideally, a combination of competitive bidding and age-sex adjustment could be used in rate setting, but this has not been investigated in the competitive bidding process in Wisconsin. Since 1983, Wisconsin has moved toward a less expensive AFDC population, based on age and sex, in Dane and Milwaukee Counties. However, this trend could swing in the other direction in future years. It was found that the rates calculated in this analysis were relatively insensitive to possible data errors and small sample sizes.

Unless HMO's indicate an interest in age-sex adjustment of capitation rates, the current system of countywide rates will be continued.

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Testing a diagnosis-related group index for skilled nursing facilities

by Philip G. Cotterill

Interest in case-mix measures for use in nursing home payment systems has been stimulated by the Medicare prospective payment system (PPS) for short-term acute-care hospitals. Appropriately matching payment with care needs is important to equitably compensate providers and to encourage them to admit patients who are most in need of nursing home care. The skilled nursing facility (SNF) Medicare benefit covers skilled convalescent or rehabilitative care following a hospital stay. Therefore, it might appear that diagnosis-related groups (DRG's), the basis for patient classification in PPS, could also be used for the Medicare SNF program. In this study, a DRG-based case-mix index (CMI) was developed and tested to determine how well it explains cost differences among SNF's. The results suggest that a DRG-based SNF payment system would be highly problematic. Incentives of this system would appear to discourage placement of patients who require relatively expensive care.

Introduction

In the past several years, case-mix measures for nursing homes have been developed in an attempt to reflect differences in the resource intensity of the care needed by different types of nursing home patients and to incorporate these differences into payment systems. (For a review of the literature on this subject, see Stassen and Bishop, 1983). Interest in prospective payment systems has fostered work on case-mix measures. Prospective rates based on average costs without adjustments for case-mix differences would encourage nursing homes to admit only those patients with the lowest resource needs. Therefore, access would be difficult for the patients most in need of nursing home care, who often require relatively expensive care.

The Medicare prospective payment system (PPS) for short-term acute care hospitals has reinforced interest in case-mix-adjusted payment for nursing homes. PPS creates an incentive for hospitals to discharge Medicare patients sooner than they would have been discharged under retrospective cost-based reimbursement. Reductions in hospital lengths of stay may also result in an increased number of sicker Medicare beneficiaries who need nursing home care.

For several reasons, the patient classification system of diagnosis-related groups (DRG's), which serves as the basis for payments in PPS, is a logical candidate as the case-mix measure for a prospective payment system for the Medicare skilled nursing facility (SNF) program. First, the SNF Medicare benefit covers skilled convalescent or rehabilitative care following a hospital stay of at least 3 days. It thus seems appropriate to classify the SNF stay in the same terms as the hospital stay. Second, a common classification system for hospital and SNF care would greatly facilitate the eventual development of an inclusive payment for an episode involving both types of care. Third, administration of a Medicare SNF prospective payment system would be simpler and less costly if each SNF patient could be assigned to a DRG prior to admission to the SNF. Any case-mix measure that required patient assessment after admission to the SNF would be very expensive. It would involve consistent and accurate collection of potentially detailed primary data. Moreover, Medicare SNF patients are spread across more than 5,000 SNF's, the majority of which have very few Medicare patients.

However, there are reasons to question the feasibility of basing Medicare SNF payment on DRG's. Evidence exists that diagnosis is not a strong predictor of differential use of nursing home resources for Medicare SNF patients (Health Care Financing Administration, 1985). It has been shown that the care needs of nursing home patients arise primarily from the need for assistance in performing basic activities of daily living, such as eating, dressing, bathing, and toileting. Research does indicate that Medicare SNF patients differ from other nursing home patients in ways that are consistent with Medicare's focus on short-term convalescent or rehabilitative care (Shaughnessy et al., 1985). However, it is not known whether functional dependency varies systematically across DRG's. Also, functional dependency may vary as much within as across DRG's. The presence of multiple diagnoses for a patient may also limit the usefulness of any single diagnosis in predicting utilization of SNF resources. In short, the relative importance of case mix and intercorrelations among its various dimensions remain unsettled questions.

These issues were explored by testing the extent to which a DRG-based case-mix index (CMI) explains differences in cost among SNF's. For reasons related to the nature of the data available (discussed in detail later), the CMI's tested in this study are based on a DRG derived from the SNF admission diagnosis rather than the hospital discharge diagnosis. Medicare data for 1980 indicate that these diagnoses differ for two-thirds of SNF stays. As a result, this article does not directly bear on the issue of using the hospital DRG as the basis for SNF payment. Rather, the more general issue is addressed of the applicability of DRG's as a classification system for SNF payment.

The main components of the study were construction of DRG-based CMI's for SNF's and

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multiple regression analysis of SNF costs, including the SNF CMI's as explanatory variables. In the analysis of SNF costs, two issues were addressed: the degree of explanatory power of the SNF CMI and the magnitude of the effect of the CMI on SNF costs. Both issues have implications for the use of SNF DRG's as the basis for case-mix adjustments in a potential Medicare SNF prospective payment system.

First, if the SNF CMI does not have explanatory power comparable with that of the hospital CMI and of variables that serve as proxy measures of SNF case mix, its usefulness as an SNF payment variable is highly questionable.

Second, and equally important, the magnitude of the cost differences associated with differences in the SNF CMI would determine the incentives for SNF's to admit patients with different levels of care needs. If SNF's were paid a fixed rate for each DRG (subject to adjustments for wage differences), an SNF's payments would be proportional to its CMI. (An SNF would receive 10-percent higher payments if its CMI were 1.10 than if it were 1.00.) If, however, an SNF's costs do not vary proportionally with its CMI, there will be a financial incentive to avoid certain types of patients. In particular, if costs are disproportionately higher for higher CMI's, SNF's will have an incentive to avoid patients with greater than average care needs. For example, suppose that an SNF with a CMI of 1.10 had costs 15 percent higher than they would be if its CMI were 1.00. The additional cost (15 percent) exceeds the additional payment (10 percent), and the SNF has no financial incentive to accept the more intensive case mix.[1] Appropriately matching payment with care needs is important to equitably compensate providers and to encourage them to admit patients who are most in need of SNF care.

The article is organized as follows. First, the chief tasks involved in the construction of the SNF CMI's are described and descriptive statistics are presented, including a comparison with the hospital CMI used in PPS and described by Pettengill and Vertrees (1982). Next, findings of the analysis of SNF costs are presented. A variant of the hospital cost equation that Pettengill and Vertrees (1982) used to test the hospital CMI was estimated, and the SNF results were compared with the hospital findings. With some adaptation, the SNF cost equation estimated by Sulvetta and Holahan (1986) was reestimated, adding SNF CMI measures to the equation. Finally, there is a discussion of the implications of the study results for the use of DRG's as the basis for case-mix adjustments in a potential Medicare SNF prospective payment system.

SNF case-mix index construction

The construction of the SNF CMI involved three tasks.

- A DRG based on the SNF admission diagnosis was assigned to every Medicare SNF admission in calendar year 1980 that involved at least 1 covered day.
- Relative weights were constructed for SNF DRG's to measure the expected resource intensity of cases in each DRG relative to the average case.
- CMI's were computed for each SNF by multiplying each DRG's relative weight by the proportion of an SNF's total cases in each DRG, then summing these products over all DRG's.

DRG assignment

The "DRG grouper" software used in PPS was modified so that a DRG could be assigned to each 1980 Medicare SNF stay. Three data elements were used in determining SNF DRG's: the diagnosis recorded as the reason for admission to the SNF, an indicator of whether additional diagnoses were recorded, and the patient's age.

The SNF DRG may not be the same as the DRG associated with the hospital stay that qualified the patient for admission to the SNF for the following reasons:

- The SNF admission diagnosis may differ from the hospital principal diagnosis.
- The SNF stay record contains no information about surgical procedures performed during the hospital stay, an important determinant of the hospital DRG.
- The SNF and hospital stay records may differ as to whether additional diagnoses were present or recorded.
- The patient's age may differ on the SNF and hospital stay records.

All of these differences may occur either for good cause or because of inaccuracies in the data. Because of these differences, the issue of combining hospital and SNF payments for episodes of care is not directly addressed in this article. Instead, the more general issue of DRG's as a case-mix measure for SNF's is explored.

It is possible to determine the hospital DRG for the roughly 20 percent of SNF stays that match the hospital stays contained in the Medicare provider analysis and review (MEDPAR) data files. The chief reason for not using those files is that few SNF's have enough MEDPAR cases to create a reliable CMI. As a result, too few observations would be available for the cost analysis.

DRG's were assigned to approximately 220,000 SNF stays in 5,157 SNF's. The number of stays ranged from more than 42,000 in DRG 236 (fractures of the hip and pelvis) to about 500 cases in DRG 202 (cirrhosis and alcoholic hepatitis), the least frequent DRG used in the study.

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[1] An algebraic exposition of the relationships among payments, costs, and the CMI is available from the author on request.

DRG relative weights

Relative weights measure the expected resource consumption of each SNF DRG relative to the resource consumption of the average case across all DRG's. Two simplifications were adopted in deriving the SNF DRG relative weights. First, primarily for computational ease, the analysis was restricted to the 66 most frequent DRG's, which comprise over 90 percent of the SNF stays. Second, charges rather than costs were used as the proxy measure of resource consumption.

Charges were used for several reasons. They are available on the SNF stay file, whereas costs are more difficult to compute. Missing data on ancillary cost-to-charge ratios would have necessitated the elimination of many SNF's and significantly reduced the number of cases that could be used to calculate relative weights. Finally, charge weights have been shown to correspond very closely to cost weights (Cotterill, Bobula, and Connerton, 1986) and are now used in the Medicare PPS (*Federal Register*, 1985).

Separate weights were constructed on a per-day and a per-case basis. The day is the traditional unit of payment for nursing home care, and individual variations in length of stay may make case payment impractical. However, there is little if any research in which the feasibility of per-case payment for nursing homes is tested. Additionally, there is interest in eventually linking SNF payment with the per-case payment of hospitals under PPS. Therefore, it was elected to construct per-case relative weights and CMI's.

Six sets of relative weights were constructed based on accommodations, ancillary, and total charges per day and per case. Separate weights were computed for accommodations and ancillary charges to determine whether SNF DRG's affect these components of care differently. The accommodations weights probably underestimate cost variations among SNF DRG's because relatively few SNF's set daily rates based on the nursing and other routine services required by individual patients. Routine costs, which correspond to accommodations charges, represent about 80 percent of total costs, so the total charge weights are also expected to underestimate the variation in total cost among SNF's. Only covered charges and covered days were used in the calculations.

All charge variables were standardized for geographical wage rate differences. Some cases were eliminated on the basis of extreme values for accommodations or ancillary charges per day. After inspecting the means and standard deviations of these variables for each DRG, cases were excluded if wage-adjusted accommodations charges per day were less than $20 or more than $200 or wage-adjusted ancillary charges per day were more than $200. Cases with covered days in excess of the maximum 100 days were also excluded. These exclusions were made to eliminate unreasonable data values that, in all likelihood, result from errors in coding the data. These criteria resulted in the elimination of 3,301 cases, or 1.6 percent of all cases in the top 66 DRG's.

Relative weights were computed by dividing each average charge variable for each DRG by the corresponding average charge for all cases or days for all 66 DRG's. Examination of the resulting relative weights reveals that:

- The range of values among DRG's is smaller for SNF's than it is for hospitals. The minimum SNF weight is .348, and the maximum is 1.51. (Both are weights for ancillary charges per case.) Weights for total charges per case range from .519 to 1.423, compared with a range of .346 to 7.48 among weights for hospital total operating costs. Weights for total charges per day range only from .791 to 1.283.
- Per-case weights display greater dispersion than per-day weights because of variation in length of stay as well as in charges per day.
- Ancillary weights display greater dispersion than accommodations weights. The standard deviation of the per-day accommodations weights is only about 8 percent of the mean, compared with a standard deviation of 20-30 percent for the ancillary weights.

SNF case-mix indexes

Six CMI's were computed for each SNF represented in the 1980 Medicare SNF stay file. CMI's were calculated by multiplying the appropriate relative weight for each SNF DRG by the proportion of the SNF's cases or days in each DRG, then summing these products for the 66 DRG's. Of the 5,118 SNF's, 28 percent (1,442) had more than 50 stays, 48 percent (2,472) had 11-50 stays, and 24 percent (1,204) had 10 stays or less. However, because virtually all 1980 cases in these DRG's were included, the CMI's are not subject to sampling error. The CMI's are representative of SNF cases in the 66 DRG's even when the total number of cases is small.

The number of DRG's represented in any SNF's CMI ranges from 1 to 64. About one-third of the SNF's had cases in more than 20 DRG's, and another one-third had cases in 10-20 DRG's. The value of an SNF's CMI is not highly correlated with the number of DRG's represented. The Pearson correlation coefficients range from −.07 for the CMI based on accommodations charges per case to +.05 for the CMI based on ancillary charges per day.

How well CMI's explain cost variation among SNF's depends more on the extent of variation among CMI's than on the variation among relative weights. However, it is useful to note that the CMI's are consistent with the relative weights. For example, most SNF's diversify their caseload among several DRG's; thus, the CMI's are expected to vary less than the SNF DRG relative weights do. Indeed, the standard deviations of the CMI's are only one-half to one-third as large as those of the relative weights. Further, the pattern of dispersion among the six different CMI's is similar to that among the six sets of relative weights.

- The per-case CMI's display greater dispersion than do the per-day CMI's. The standard deviations of the per-case CMI's, which range from .07 to .13, are from 1½ to 2 times as large as those of the per-day CMI's.
- The CMI's based on ancillary charges vary more than those based on routine and total charges. The standard deviations of the CMI's for ancillary charges range from .09 to .13 and are roughly two to three times larger than those for routine and total charges.

SNF CMI's are less dispersed than hospital CMI's are. The standard deviation of the CMI based on total charges per case is .08 for SNF's, compared with .10 for hospitals. The smaller variation in SNF CMI's is plausible because hospitals span a much greater range of complexity in technology and procedures than do SNF's.

The greater the variation in a CMI, the greater its potential for explaining cost differences among SNF's. In Table 1, the means and standard deviations of the six CMI's are presented for all 5,118 SNF's. Information on the 3,410 SNF's that could be identified from Medicare cost report data is displayed by selected characteristics known to be associated with significant cost differences: hospital-based or freestanding status and urban or rural location. Hardly any variation exists in the average CMI's of SNF's with these characteristics. Because the costs of hospital-based SNF's are approximately twice those of freestanding SNF's, it is interesting that their CMI's differ very little. In contrast, 1981 Medicare hospital data show considerable variation by cost-related characteristics. The average CMI for rural hospitals was .96, compared with 1.04 for urban hospitals and 1.14 for hospitals with large teaching programs.

In their study of SNF costs, Sulvetta and Holahan (1986) found the percent of an SNF's days provided to Medicare patients to be an important predictor of cost. The CMI's for SNF's are shown in Table 2 according to the percent of Medicare days: less than 10 percent, 10-35 percent, 36-65 percent, and more than 65 percent. The variation in the CMI's across the four Medicare groups is small. However, the pattern is consistent for all CMI's: a higher mean CMI is associated with a higher percent of Medicare days. The range in means across the Medicare groups varies from 1 percentage point for CMI 1 (accommodations charges per day) to 5 percentage points for CMI 2 (ancillary charges per day) and 7 percentage points for CMI 5 (ancillary charges per case).

Despite the limited variation in the SNF CMI's (Tables 1 and 2), the results are consistent with previous research. The findings of Shaughnessy et al. (1985) and Sulvetta and Holahan (1986) suggest that a higher proportion of Medicare days is positively related to the intensity of case mix. Lack of variation in the CMI's between hospital-based and freestanding SNF's is also consistent with the Shaughnessy et al. (1985) finding that most of the case-mix differences between hospital-based and freestanding SNF's were attributable to the presence of sicker non-Medicare patients in hospital-based SNF's. These facilities differ relatively little in the types of Medicare patients served.

Analysis of SNF costs

As stated earlier, two previous cost function analyses (Pettengill and Vertrees, 1982; Sulvetta and Holahan, 1986) served as the point of departure for this investigation of the relationship between the SNF CMI's and SNF costs. In this section, the basic results of the regression analysis of SNF costs are presented. Next the implications of these results are explored to answer the following questions:

- Is the explanatory power of the SNF CMI strong enough to be a useful payment variable?
- How would the size of the SNF CMI impact on costs affect placement of heavy- and light-care SNF patients in a potential Medicare SNF payment system based on SNF DRG's?

Hospital cost function

The first test of the explanatory power of the CMI's involved estimating the SNF analog of the equation for hospital cost per case used by Pettengill and Vertrees (1982) to test the hospital CMI. In the hospital equation, cost is assumed to depend on bed size, the Bureau of Labor Statistics hospital wage index, location (rural and three city-size variables), and the CMI. The hospital cost equation serves as a useful comparison because, for the most part, it contains the variables used in PPS to adjust payments.

Instead of estimating one equation for total operating costs per case, six equations and six dependent variables were estimated corresponding to each of the SNF CMI's: routine, ancillary, and total costs both per day and per case. The only variable from the hospital equation not in the SNF equation is the extent of the hospital's teaching activity. As in Pettengill and Vertrees (1982), all continuous variables are expressed in logarithms.

Each of the six equations was estimated five times: for all SNF's and for each of the four Medicare groups shown in Table 2. Separate equations were used for the Medicare groups because the SNF CMI was expected to have greater explanatory power for SNF's with a higher percent of Medicare days. The SNF CMI is based only on Medicare cases, whereas the cost variables pertain to all patients cared for in Medicare-certified beds. Therefore, the higher the percent of Medicare days, the better the correspondence between the CMI's and the cost variables. Moreover, the separate equations provide additional information about the relationship between the CMI's and the percent of Medicare days variable, which may itself be a proxy measure of case mix.

Table 1

Mean and standard deviation of case-mix indexes (CMI's) for Medicare-certified skilled nursing facilities (SNF's), by type of SNF and CMI: United States, 1980

		Type of SNF			
		Freestanding		Hospital based	
CMI	All SNF's	Urban	Rural	Urban	Rural
Number of SNF's[1]	5,118	2,320	621	234	235
CMI 1: Accommodations charges per day	.999 (.027)	.999 (.026)	.997 (.022)	.998 (.023)	1.00 (.029)
CMI 2: Ancillary charges per day	.983 (.093)	.987 (.091)	.981 (.084)	.985 (.091)	.974 (.101)
CMI 3: Total charges per day	.995 (.037)	.996 (.036)	.993 (.031)	.995 (.033)	.994 (.039)
CMI 4: Accommodations charges per case	.997 (.071)	.998 (.070)	.996 (.068)	.999 (.067)	.995 (.078)
CMI 5: Ancillary charges per case	.987 (.135)	.991 (.132)	.986 (.130)	.992 (.138)	.974 (.135)
CMI 6: Total charges per case	.995 (.084)	.997 (.082)	.993 (.081)	.997 (.082)	.990 (.088)

[1] The 4 types of SNF's total to 3,410 rather than 5,118. Information on type of SNF comes from the Medicare cost report file, which includes only 3,410 of the 5,118 SNF's in the stay file. The number of SNF's shown here also differs from the number of SNF's reported in Tables 2-6. Tables 2-6 reflect the number of SNF's included in regressions, and the elimination of missing and statistical outlier data accounts for the smaller number used.

Table 2

Mean and standard deviation of case-mix indexes (CMI's) for Medicare-certified skilled nursing facilities (SNF's), by percent of Medicare days and CMI: United States, 1980

		Percent of Medicare days			
CMI	Total	Less than 10	10-35	36-65	More than 65
Number of SNF's	2,817	1,887	602	192	136
CMI 1	.999 (.023)	.997 (.025)	.999 (.016)	1.004 (.015)	1.009 (.019)
CMI 2	.987 (.080)	.976 (.088)	1.004 (.054)	1.014 (.049)	1.029 (.045)
CMI 3	.996 (.031)	.992 (.034)	1.000 (.020)	1.006 (.019)	1.014 (.019)
CMI 4	.997 (.062)	.989 (.065)	1.014 (.050)	1.014 (.052)	1.017 (.053)
CMI 5	.991 (.118)	.973 (.126)	1.022 (.091)	1.026 (.093)	1.042 (.085)
CMI 6	.996 (.073)	.985 (.077)	1.016 (.059)	1.017 (.061)	1.023 (.059)

NOTE: See Table 1 for definitions of CMI's and explanatory footnote.

The overall explanatory power of these equations (R^2), is presented along with the regression coefficients of the CMI's and their t statistics in Table 3. These results do not compare favorably with the results for hospital costs. Pettengill and Vertrees (1982) explained 72 percent of the variation in hospital's total operating costs per case. In contrast, as seen in Table 3, the highest R^2 for any SNF equation is .28 (total cost per day for SNF's with more than 65 percent Medicare days). R^2 values of less than .10 are common.

However, the results for the individual regression coefficients of the SNF CMI's are considerably better than the overall explanatory power of the equation. Most coefficients are statistically significant at the .05 level or better. The largest t statistic shown in Table 3 is 10.6, which is highly significant. Nevertheless, the results are weaker than the hospital results, for which the CMI coefficient had a t statistic greater than 25.

The size of the CMI's effect on costs tends to increase as the SNF's percent of Medicare days increases. The size of these coefficients is particularly striking. For example, the coefficient for total cost per day of SNF's with more than 65 percent Medicare days is 11.45. This implies that a 10-percent difference in the CMI would be associated with a 114.5-percent difference in total cost per day.

Table 3

R^2 values, case-mix index (CMI) regression coefficents, and *t* statistics for hospital cost equation[1] adapted for skilled nursing facilities (SNF's), by percent of Medicare days: United States, 1980

		Percent of Medicare days			
Equation	Total	Less than 10	10-35	36-65	More than 65
Number of SNF's	2,817	1,887	602	192	136
Routine cost per day and CMI 1:					
R^2	.01	.01	.06	.04	.13
Regression coefficient	*1.80	.63	*3.09	*4.82	*5.41
t statistic	3.31	1.00	2.50	2.06	2.98
Ancillary cost per day and CMI 2:					
R^2	.16	.03	.03	.03	.00
Regression coefficient	*1.90	.20	*1.44	*2.94	*4.68
t statistic	6.52	.70	2.18	1.97	1.96
Total cost per day and CMI 3:					
R^2	.12	.05	.13	.18	.28
Regression coefficient	*1.07	*−.54	*3.42	*5.63	*11.45
t statistic	4.88	2.68	6.25	4.53	6.33
Routine cost per case and CMI 4:					
R^2	.04	.03	.16	.14	.10
Regression coefficient	*1.99	*1.23	*3.23	*3.31	*1.40
t statistic	10.4	5.23	8.92	5.06	2.21
Ancillary cost per case and CMI 5:					
R^2	.09	.02	.00	.00	.00
Regression coefficient	*2.27	*1.16	.89	*2.42	1.60
t statistic	8.10	3.96	1.39	1.96	.78
Total cost per case and CMI 6:					
R^2	.05	.02	.15	.13	.10
Regression coefficient	*1.77	*.974	*2.75	*3.00	*1.50
t statistic	10.6	4.90	8.75	5.31	2.44

*Significant at least at .05 level.

[1] (Pettengill and Vertrees, 1982).

NOTE: The regression coefficient indicates the percentage difference in cost associated with a 1-percent difference in the CMI. See Table 1 for definitions of CMI's and explanatory footnote.

Three conclusions can be drawn from the results shown in Table 3.

- The statistical significance of the SNF CMI's indicates that a systematic positive relationship exists between CMI's and SNF costs.
- The variables that are important in explaining cost differences among hospitals explain relatively little of the total cost variation among SNF's.
- In most cases, the size of the impact of the SNF CMI on costs is quite large and indicates that SNF costs vary more than proportionally with differences in the CMI. According to these elasticity estimates, an SNF with a CMI greater than 1.0 would have costs in excess of its DRG payments, whereas an SNF with a CMI lower than 1.0 would receive payments that exceed its costs. The effect of these disparities would be to discourage SNF's from accepting Medicare patients with above average care needs. Setting SNF DRG payment rates could thus present serious problems of perverse placement incentives.

SNF cost function

The second test of the ability of the CMI's to explain variation in SNF costs involved reestimating the equations reported in Sulvetta and Holahan (1986), adding the SNF CMI to their equation. In their equation, cost is assumed to be a function of several factors. Bed size, rural-urban location, wage index, occupancy rate, type of ownership, whether the SNF belongs to an investor-owned chain, whether the SNF is hospital based, and whether the SNF is a distinct-part facility are all included, as are two proxies for case mix: percent of Medicare days and admissions per bed. These variables explain about 55 percent of the total variation in cost. When dichotomous variables for each State are added, the equation explains 64 percent of the variation in total cost per day and 67 percent of the variation in routine cost per day. The most highly significant variables are percent of Medicare days, hospital-based status, occupancy rate, type of ownership, and wage index. In contrast to the hospital equation, this equation contains several structural characteristics that contribute significantly to the explanation of cost variation but are not likely candidates for incorporation into a payment system.

In reestimating the Sulvetta and Holahan (1986) equations, as with the hospital cost equation, routine, ancillary, and total costs both per day and per case were used as dependent variables. Again, separate equations were run for each of the four Medicare groups. To facilitate comparison of these results with those of Sulvetta and Holahan (1986), the equations were not estimated in logarithmic form.

Table 4

R^2 values, case-mix index (CMI) regression coefficients, and t statistics for skilled nursing facility (SNF) equation[1] adapted for use with CMI's, by percent of Medicare days: United States, 1980

Equation	Total	Percent of Medicare days: Less than 10	10-35	36-65	More than 65
Number of SNF's	2,817	1,887	602	192	136
Routine cost per day and CMI 1:					
R^2	.54	.36	.52	.61	.72
Regression coefficient	*.33	−.02	*.88	*2.15	*2.71
t statistic	2.80	−.13	2.99	2.72	2.42
Ancillary cost per day and CMI 2:					
R^2	.50	.08	.19	.31	.31
Regression coefficient	*.06	.00	.07	*.71	*1.41
t statistic	3.03	.29	1.57	3.96	3.42
Total cost per day and CMI 3:					
R^2	.60	.33	.52	.58	.67
Regression coefficient	*.18	*.24	*1.46	*2.85	*4.18
t statistic	1.50	2.32	5.26	3.20	2.29
Routine cost per case and CMI 4:					
R^2	.24	.22	.33	.40	.39
Regression coefficient	*23.91	*12.60	*45.14	*43.81	*18.54
t statistic	8.29	3.73	6.87	3.76	1.30
Ancillary cost per case and CMI 5:					
R^2	.34	.05	.12	.16	.10
Regression coefficient	*2.40	*.82	*2.66	*17.52	10.02
t statistic	4.89	1.97	2.40	4.84	1.24
Total cost per case and CMI 6:					
R^2	.28	.20	.29	.33	.28
Regression coefficient	*23.62	*11.02	*46.13	*66.10	61.59
t statistic	7.94	3.37	6.63	4.59	.49

*Significant at least at .05 level.

[1] (Sulvetta and Holahan, 1986).

NOTE: The regression coefficient indicates the dollar difference in cost associated with a 1-percent difference in the CMI. See Table 1 for definitions of CMI's and explanatory footnote.

The results of reestimation of this equation are presented in Table 4. The R^2 values for the logarithmic equations in Table 3 are not directly comparable with those for the linear equations in Table 4 because the total variation in cost differs when the cost variable is transformed into logarithms (Rao and Miller, 1971). However, the resultant differences in R^2 should not be large enough to confound the basic comparisons of interest.

The overall explanatory power of the equations shown in Table 4 is much greater than that of the equations shown in Table 3. R^2 values for the per-day regressions in Table 4 range from a high of .72 for routine cost per day for SNF's with more than 65 percent Medicare days to a low of .08 for ancillary costs for SNF's with less than 10 percent Medicare days. R^2 values of equations for total cost per day range from .33 for SNF's with less than 10 percent Medicare days to .67 for SNF's with more than 65 percent Medicare. The explanatory power of the per-day regressions is typically about twice that of the per-case regressions.

The results shown in Table 4 for the individual CMI coefficients are consistent with those shown in Table 3. Most coefficients are statistically significant at the .05 level. In addition, the size of the CMI coefficient tends to be greater in SNF's with a larger percent of Medicare days.

The CMI coefficients shown in Tables 3 and 4 should be interpreted differently. The continuous variables in the hospital equation are in logarithms, so the CMI coefficients in Table 3 are elasticity estimates; that is, they indicate the percentage difference in cost associated with a 1-percent difference in the CMI. The coefficients shown in Table 4 are simple linear estimates. They indicate the dollar difference in cost associated with a difference in the CMI of 1 percentage point. However, the coefficients in Table 4 can be used to compute elasticities for mean values of cost and the CMI's. These calculations yield elasticities greater than 1, a finding that is consistent with the results shown in Table 3 and indicates that SNF costs vary more than proportionally with the CMI. In general, the results shown in Table 4 reinforce the conclusion drawn from Table 3 regarding the strength and size of the positive relationship between the CMI's and SNF costs.

Explanatory power of SNF CMI

Do the results of the multiple-regression cost analysis imply that the explanatory power of the SNF CMI is great enough to make it a useful variable for SNF payment? The statistical significance of the SNF CMI regression coefficients shown in Tables 3 and 4 generally indicates (with a probability of .95 or more) that the estimated positive relationship between the CMI and SNF costs is not merely a chance occurrence. However, statistical significance alone is not sufficient to answer the question. No definitive standards exist, so two criteria are applied:

- How does the explanatory power of the SNF CMI compare with that of the hospital CMI?
- How does the explanatory power of the SNF CMI compare with that of the two proxy variables for Medicare SNF case mix, percent of Medicare days and admissions per bed?

Impact on R^2 values

To assess the relative explanatory power of the SNF and hospital CMI's, the CMI was added to the cost equations and the resulting changes in their explanatory power (as measured by changes in the R^2) were compared. It is necessary to compare changes rather than R^2 alone because independent variables other than the CMI also contribute to overall explanatory power.

The change in R^2 that occurs when the relevant SNF CMI is added to the basic equation of Sulvetta and Holahan (1986), excluding State variables, is shown in Table 5. Increases in R^2 attributable to the addition of the CMI range from zero for all SNF's combined and for the group with less than 10 percent Medicare days to 5-10 percentage points for several per-case CMI's for SNF's with more than 10 percent Medicare days. The maximum increase in R^2 for any per-day equation is 6 percentage points for ancillary costs per day in the groups with 36-65 percent and more than 65 percent Medicare. An increase of 2 percentage points is common in the per-day equations.

To test whether the regressions reported in Table 5 might understate the explanatory power of the SNF CMI, the CMI was added to a version of the Sulvetta and Holahan (1986) equation that does not contain the two case-mix proxy variables, percent of Medicare days and admissions per bed. The resulting changes in R^2 were examined. Deleting these two variables reduces the R^2 significantly in a majority of cases but has very little impact on the change in R^2 obtained by adding the CMI to the equation. These effects are very similar to the ones shown in Table 5. As a result, they are not reported in this article.

A similar comparison was made for hospitals: adding the hospital CMI to the equation for total operating costs per case and observing the change in the R^2. Adding the CMI to the set of independent variables (bed size, wage index, rural and city-size location variables, and teaching commitment) increases the R^2 for the equation from .69 to .72.

This difference of 3 percentage points is comparable with the changes shown in Table 5 for SNF's with a high percent of Medicare days. Thus, in this comparison, the SNF CMI appears to have as much explanatory power as does the hospital CMI. However, there is an important difference between the effects of the hospital CMI and the SNF CMI. The R^2 increase of 3 percentage points attributed to the hospital CMI understates its explanatory power. The hospital CMI and the wage index alone explain approximately 68 percent of the variation in hospital operating costs per case. However, the SNF CMI and the wage index explain at most 28 percent of SNF total costs per case (for SNF's with more than 65 percent Medicare days). Of course, this result indicates that the hospital CMI is correlated with other variables that are themselves highly correlated with hospital costs.

Correlations with other independent variables

To pursue this point further, hospital and SNF CMI's were regressed on the independent variables in their respective cost equations. For hospitals, the CMI was regressed on bed size, rural and urban variables, wage index, and teaching activity. The R^2 of this equation was .42, and the bed-size variable was particularly important.

For SNF's, each CMI was regressed on the variables in the Sulvetta and Holahan (1986) equation. For all SNF's combined, regardless of percent of Medicare days, the R^2 values for these equations range from .03 to .05. When the sample is restricted to SNF's with more than 10 percent of Medicare days, some R^2 values improve, but they never exceed .12. Clearly the SNF CMI's are much less highly correlated with other independent variables than is the hospital CMI.

In the hospital case, the high degree of intercorrelation makes it difficult to precisely identify how much cost variation is attributable to case mix. However, large urban teaching hospitals treat a more complex mix of cases than is found in small, rural nonteaching hospitals. Therefore, the high intercorrelation provides some assurance that the CMI is measuring what it is intended to measure.

In the SNF case, the intercorrelations are much lower and are only slightly suggestive of relationships consistent with other evidence. In certain subgroups of SNF's, some statistically significant positive relationships occur among various SNF CMI measures and the variables hospital-based status and percent of Medicare days. (The correlation between the CMI and percent of Medicare days was apparent in Table 2, but the correlation between the CMI and hospital-based status was not apparent in Table 1.) In addition, a statistically significant negative relationship exists between some CMI measures and proprietary ownership. However, in none of these cases is the relationship comparable with the degree of intercorrelation observed among the hospital variables.

Unfortunately, there are two ways of interpreting the SNF results. On the one hand, the effect of the SNF CMI might represent the true case-mix effect, which is not highly correlated with other SNF characteristics. On the other hand, the SNF CMI's low degree of intercorrelation with other variables provides little assurance that it is accurately measuring the true case-mix effect. Given the lack of other corroborative evidence, it is not clear what effects the SNF CMI is capturing.

Table 5

R^2 values for skilled nursing facility equation with and without addition of case-mix indexes (CMI's), by percent of Medicare days: United States, 1980

Equation	Total	Percent of Medicare days			
		Less than 10	10-35	36-65	More than 65
Routine cost per day:					
R^2 without CMI 1	.54	36	.52	.59	.71
R^2 with CMI 1	.54	.36	.52	.61	.72
Ancillary cost per day:					
R^2 without CMI 2	.50	.08	.19	.25	.25
R^2 with CMI 2	.50	.08	.19	.31	.31
Total cost per day:					
R^2 without CMI 3	.59	.33	.49	.56	.65
R^2 with CMI 3	.59	.33	.52	.58	.67
Routine cost per case:					
R^2 without CMI 4	.22	.21	.28	.36	.38
R^2 with CMI 4	.24	.22	.33	.40	.39
Ancillary cost per case:					
R^2 without CMI 5	.34	.05	.11	.06	.09
R^2 with CMI 5	.34	.05	.12	.16	.10
Total cost per case:					
R^2 without CMI 6	.26	.20	.24	.26	.28
R^2 with CMI 6	.28	.20	.29	.33	.28

NOTE: All R^2 statistics are adjusted for degrees of freedom. See Table 1 for definitions of CMI's and explanatory footnote.

Further tests of explanatory power

To further assess the extent to which cost differences are associated with CMI differences, the CMI regression coefficient was multiplied by the standard deviation of the CMI. The result represents the cost difference associated with a difference in the CMI of one standard deviation. Dividing this amount by the standard deviation of the relevant cost variable produces the beta coefficient, a relative measure of the variation in cost associated with variation in the CMI.

These computations were performed for each of the six CMI's and their corresponding cost variables. The CMI regression coefficients were based on the linear SNF equation used for Table 4, which was reestimated pooling the data for all SNF's with more than 10 percent Medicare days. Also, the standard deviations of CMI and cost variables for all SNF's with more than 10 percent Medicare days were used in computing the beta coefficients. The resulting cost differences associated with the CMI range from $1.93 (ancillary cost per day) to $5.08 (total cost per day) and from $66.31 (ancillary cost per case) to $277.64 (total cost per case.) The relative measures range from 10 percent (routine cost per day) to 13 percent (total cost per day) and from 14 percent (ancillary cost per case) to 21 percent (routine cost per case). An analogous computation for hospital total operating cost per case yields a relative CMI effect of 22 percent. Clearly, the cost variation associated with the SNF CMI's tends to be less than that associated with the hospital CMI used in PPS.

Finally, the explanatory power of the SNF CMI was compared with that of the two proxy case-mix variables, percent Medicare days and admissions per bed. As in the previous case, the beta coefficients were based on the regression coefficients and standard deviations of all variables for SNF's with more than 10 percent Medicare days. Even within this group, percent of Medicare days accounts for about twice as much variation in cost as does the SNF CMI. (The beta coefficients are roughly double those of the SNF CMI variables.) However, considerably less cost variation is typically accounted for by admissions per bed than by the per-day SNF CMI's. The per-case comparisons can be ignored because there is, by definition, a fairly high negative correlation between costs per case and admissions per bed. (Admissions per bed and length of stay are approximate reciprocals, and length of stay is positively correlated with cost per case.)

Discussion

In summary, this examination indicates that the SNF CMI explains somewhat less cost variation than does the hospital CMI and considerably less than does percent of Medicare days, a proxy case-mix variable. The differences between SNF and hospital CMI's are interesting and difficult to interpret. The high correlation between the hospital CMI and hospital size provides some indication that the CMI is measuring what it is intended to measure. The lack of any comparably strong correlation between the SNF CMI and any other identifiable SNF characteristic offers no such comfort. Two plausible possibilities exist:

- SNF case-mix differences may be largely uncorrelated with the other factors associated with cost differences. The variety among State Medicaid programs and the different orientations of various types of nursing home ownership may have created a patchwork quilt of care patterns that bears little relation to Medicare SNF case mix.
- Limitations of the data and of the applicability of DRG's may reduce the explanatory power of the SNF CMI measures and bias upward the SNF CMI elasticity estimates.

Data limitations are most likely to involve errors in measurement of the SNF CMI and omitted variable effects. For example, measurement errors may compress the observed values of the CMI. Compression means that for above average CMI values, the observed CMI associated with a given cost value may be too low; for below average CMI values, the observed CMI may be too high. Also, some omitted independent variables (functional dependence, idiosyncratic patterns of care, and/or non-Medicare SNF case mix) may be positively correlated with the SNF CMI. If so, the cost values observed at above average levels of the CMI would be higher than they should be, and cost values observed at below average levels of the CMI would be lower than they should be.

Compression of the CMI's is likely to result from the fact that the charge data used in constructing the DRG relative weights are unlikely to capture differences in resource use among patients within the same facility who are classified in different DRG's. Compression may result from any source of variation in case mix that affects accommodations charges (routine costs). Failure of these charges to reflect patient differences in functional dependence may be especially important. Patient-level costing and pricing are not common, and when they are attempted, Medicare patients typically fall into a single category at the high end of the scale. Compression is likely to be particularly serious because routine costs account for roughly 80 percent of total costs.

Further tests were conducted to determine possible omitted variable effects. To test the possible positive correlation between idiosyncratic patterns of care and the SNF CMI, the SNF CMI was correlated with the number of nursing hours per day. The Pearson correlation coefficients range from .06 (routine cost per case) to .11 (total cost per day). These statistics suggest that this relationship could account for at least part of the upward bias in the SNF CMI elasticity estimates. When the staffing variable is added to the cost equation, the SNF CMI coefficient declines slightly in some cases, and in others it increases. No strong conclusions could be drawn from this test.

Throughout the regression analysis, the effects of non-Medicare patients on the cost variables were controlled for by partitioning the data into four Medicare groups and by including percent of Medicare days as a continuous variable. Non-Medicare patients affect the cost variable used in the analysis because the variable is a measure of the average cost of all patients treated in Medicare-certified beds. Medicare patients tend to be more expensive to care for than other patients are, so the observed cost variable may understate the cost for Medicare patients by an amount that increases as the percent of Medicare patients in the SNF decreases.

Finally, the SNF cost equations were rerun separately for hospital-based and freestanding SNF's to determine whether hospital-based SNF's might account for the disproportionate cost effect of the SNF CMI. The dichotomous hospital-based variable included in the combined cost equation might fail to completely account for the effect of a more costly non-Medicare case mix in hospital-based SNF's. This possibility was suggested by the finding of Shaughnessy et al. (1985) that much of the case-mix difference between hospital-based and freestanding SNF's could be attributed to the more intensive care needs of non-Medicare patients in hospital-based SNF's. The results did not support the hypothesis. The largest CMI coefficient is for freestanding SNF's in the group with more than 65 percent of Medicare days. It is almost as large as is the coefficient in the equation for hospital-based and freestanding SNF's combined.

These problems of omitted variables and measurement error can never be fully addressed by data of the type used in this study. Problems such as compression of the DRG relative weights and the failure to incorporate a measure of functional dependency can be addressed only by research involving primary data collection.

Conclusion

In this article, the development is described of a case-mix index for SNF's based on DRG's defined primarily by the diagnosis recorded as the reason for admission to the SNF. Tests of the relationship between SNF costs and this SNF CMI support the conclusion that DRG-based SNF payment would be highly problematic. A statistically significant positive relationship exists between the SNF CMI and SNF costs. However, the explanatory power of the relationship is generally weaker than the explanatory power of the relationship between the Medicare hospital CMI and hospital costs. Further, the relationship between SNF costs and the SNF CMI is weaker than the relationship between SNF costs and percent of Medicare days, a proxy SNF case-mix measure. These results strongly suggest that the relationship between the SNF CMI and SNF costs is not strong enough to make the SNF CMI a useful payment variable.

Finally, the estimated SNF CMI regression coefficients indicate that SNF costs vary much more than proportionally with the SNF CMI. These large positive elasticities imply that a payment system based on the relative weights developed in this study would have adverse effects on SNF admission practices. Such a payment system could discourage the admission of Medicare patients with greater than average care needs.

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Special Report

Summary of a conference on national health expenditures accounting

by Phoebe A. Lindsey and Joseph P. Newhouse

The following summary is of a conference to review national health expenditures accounting. Attendees focused on the annual article published by the Health Care Financing Administration (HCFA) in the **Health Care Financing Review** *that reports how much the United States spends on medical care.*

Overview

A conference on national health expenditures accounting was sponsored by the Health Care Financing Administration (HCFA) in conjunction with its research center at the Rand Corporation and the University of California at Los Angeles and was co-chaired by Joseph P. Newhouse, Director, Rand/UCLA Center for Health Care Financing Research, and Daniel R. Waldo, Chief, Health Expenditures Branch, Division of National Health Cost Estimates, HCFA. Participants submitted topics in advance for consideration; a list of participants and a synthesis of these topics, which served as an agenda, are provided in the technical note at the conclusion of the article.

The issues addressed at the conference included: definitions and boundaries of various categories used in the expenditures accounting, the presentation of the current accounting framework, refinements in the current framework, further disaggregation of the current framework, and possible expansions of the current framework or data base.

The value of continuity in historical times series was recognized at the outset and reinforced by participants throughout the conference. HCFA's resource limitations were also noted as a reminder that the development of new items could require adjustments in the current scope of work, and that issues related to the magnitude of spending in certain categories not currently covered in the accounts, or covered as a subset, might better be handled in one-time surveys.

Definitions and boundaries

The importance of using less aggregated classifications to obtain greater precision was raised early in the conference and recurred throughout the sessions. For example, "hospital care" currently includes everything that the hospital bills for, but for some purposes it would be desirable to group physician and resident salaries paid by the hospital with the physician expenditures and the costs of drugs provided in the hospital with drug expenditures.

Disaggregation of hospital care expenditures would allow users to construct a definition and data base suited to their particular need. The proper amount of disaggregation is, of course, a matter of judgment. For example, some participants wanted a separate accounting for "preventive care," but the boundaries of preventive care are not well agreed on, and obtaining accurate data is difficult. In particular, if the volume of preventive care is estimated from claims forms, the amount will be biased downward to an unknown degree because of the incentives to obtain greater reimbursement by coding preventive services as acute or chronic care services.

The boundaries of health care as defined by the annual article[1] are now somewhat narrowly drawn. Should the annual article cover only those expenditures related to providers of medical care services or should it be broadened? For example, should it include expenditures on environmental health and sanitation services? Should it incorporate non-health sector expenditures related to medical care services such as the costs of transportation to the physician? There was consensus that definitions not be broadened, at least for now; priority ought to be given to the other matters that will be discussed later in this summary.

An increasing number of services are being provided outside the institutional setting, many in an effort to prevent or avoid the costs of institutionalization. Custodial care services are not covered by Medicare, but they may be covered in some instances by the intermediate care facility portion of Medicaid. To that degree, some portion of these services are included in the current accounts. It was concluded that it was not feasible for the Health Care Financing Administration (HCFA) to go beyond this; not only are there problems in determining when a service is health related and when it is not (e.g., if an arthritic person purchases the time of someone to clean her house, is that a health service?), there are also problems in valuing services not purchased through the market (e.g., a wife caring for an invalid husband).

A participant suggested that a reasonable delimiter would be to confine the article to services covered by medical insurance. Precisely for gray area services, however, insurance policies vary in what they cover. It was pointed out that there might be a distinction

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[1] *National health expenditures* is a continuing series of reports begun in the Department of Health, Education, and Welfare (Reed and Rice, 1964). The series, now the responsibility of the Office of the Actuary, Health Care Financing Administration, Department of Health and Human Services, presents the National Health Accounts of the United States.

between expenditures caused by the effects of the disease but that are unrelated to its treatment or medical management (e.g., the housecleaning example cited earlier) and expenditures that are intended to affect the course of the disease or that provide symptomatic relief or relief of anxiety.

Presentation of data base

Strengthening the current data base and making it as useful as possible to a variety of users, each with different needs, was of interest to all participants. It was noted that, for the most part, data used by HCFA to generate estimates have been collected by other entities for other purposes. Following are a series of suggestions and recommendations for improving the presentation and utility of the current data base.

Highlighting revisions of earlier data

When previously published data are revised, it should be possible for the regular user to easily identify changes.

Adjustments to data

One participant noted that the data sources used for most of the noninstitutional services are incomplete and the estimates of aggregates prepared from them are thus potentially seriously biased downward. Expenditures on certain categories of service may thus be substantially understated. On the other hand, HCFA may have no firm basis for a quantitative adjustment. It was suggested that when HCFA adjusts the data, the assumptions on which the adjustments are made should be available to the user. For example, the detail on the data sources and the assumptions made in presenting the data might be incorporated in a separate appendix and made available for users who request this level of information.

Merging data sets

The usefulness of current micro data sets for estimation of national health expenditures was discussed. Of particular concern was the exclusion of decedents and the institutionalized from the micro studies. Despite those omissions, participants felt that studies such as the National Medical Care Expenditure Study (NMCES) (National Center for Health Statistics and National Center for Health Services Research, 1977) might provide cross-checks on HCFA's estimates of total and out-of-pocket spending. HCFA staff indicated that the issue of micro studies' exclusing of significant parts of the population would be brought to the attention of the Data Policy Committee, Bureau of Data Management and Strategy, HCFA, for consideration.

Timeframes

Some participants recommended the consideration of timeframes other than the calendar year for data presentation; in particular, data classified by fiscal year. The multiplicity of accounting years used by various sources means, however, that a new set of interpolations would be necessary. Seasonal adjustment of such interpolations would be difficult. Concerns were raised about false precision of such methodologies. The consensus was that the annual report continue to use the calendar year.

Input-output table

HCFA noted that an ideal approach for data presentation would be an input-output table for the health industry, similar to displays for the National Income and Product Accounts[2] (Bureau of Economic Analysis). Even though the difficulty in preparing such a table was recognized, there was support among the participants for such information.

Refinements of data base

Medical facility construction

The issue of medical facility construction costs arose. A number of participants argued that these costs are double counted in figures on national health expenditures. To avoid double counting, a user could exclude construction expenditures. However, the issue of which figure HCFA should use as "the" national health expenditure is still open. There was no consensus on whether the current treatment should be changed or on which figure to use as the national health expenditure.

The basis for the argument of double counting is that capital expenditure is counted as construction expense, but interest payments for financing and possibly depreciation allowances for that capital may also be counted as operating costs. On the other hand, the current treatment of construction costs is modeled on and consistent with that of the National Income and Product Accounts.

Assuming the present policy should continue, it was pointed out that data are not available on construction costs of private office buildings that rent office and laboratory space to private practitioners. No suggestions, however, were proffered on how to obtain such data. HCFA currently uses the survey of construction sites as a source, (U.S. Bureau of the Census); however, data are not available on the fraction of space devoted to medical purposes (indeed, how much, if any, of the building will be devoted to medical uses may not be known when the office building is constructed).

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[2] The National Income and Product Accounts, first compiled in 1940, are annual tables that have been included in the *Survey of Current Business* every July since 1982. Prior to July 1982, the tables were published each July as a supplement to the *Survey of Current Business*.

Those who believed inclusion of construction costs was double counting naturally saw no problem with this omission. Others felt the construction cost item was misleading because it focused solely on structures and omitted movable equipment. HCFA noted that data on movable equipment are not available. Again, those who believed construction costs were double counted were not troubled by this omission. As an independent point, disaggregation of nursing home construction costs was suggested.

Others were concerned about data on the sources of financing, in part to estimate the value of loan guarantees. Data on sources of financing are not obtained through the survey of construction sites. Another survey of new construction and new sources of financing (American Hospital Association) was suggested as a potential data source.

Capital formation and investment issues

Some participants suggested a separate accounting of assets or capital in the health care sector. The growth of investor-owned facilities has stimulated an interest in knowing more about health facility capital formation and investment issues. Of interest are how the sources and uses of capital are changing and what the implications are for self-financing. A statement on aggregate sources and uses of capital would assist in identifying the nature, profile, and amount of capital going into the health care system as well as changes in the use of capital over time.

It was suggested that investment firms might have data on capital formation. Since the source of funds may change from what is reported during the planning phases to the source actually used on a permanent basis, caution was suggested in interpreting these data.

It was also suggested that the capital account should not only include capital equipment but also investments in training and research.

Out-of-pocket expenditures

Out-of-pocket expenditures by consumers are currently calculated as a residual; that is, HCFA starts with total expenditures, subtracts estimated third-party payments and assumes the remainder is out-of-pocket expenditures. Thus, the estimated out-of-pocket expenditures are an amalgam of the true out-of-pocket costs, unspecified sources of funds such as endowment income and income from gift shops and parking lots, and any measurement error in the other categories (i.e., statistical discrepancy). A discussion of this is contained in the 1984 national health expenditures article (Levit, et al., 1985).

A possibility for estimating the out-of-pocket component would be to use data from household interview surveys. But, as noted earlier, data on decedents and the institutionalized are missing from household surveys, causing a potential bias. Also, some payments reported on the survey as out-of-pocket may be reimbursed by insurance subsequently. A minor accommodation would be to relabel the category to indicate that both out-of-pocket costs and the statistical discrepancy are included in the same category, but no consensus was reached on this suggestion.

A question was raised as to whether the Part B (supplementary medical insurance) Medicare premium should be considered an out-of-pocket, private expenditure; it now is not, and the expenditures it finances are considered public expenditures on medical care. Consider first the out-of-pocket issue. Individually paid premiums for private health insurance are also not treated as out-of-pocket expenditures, a designation reserved for payments at the time of service. Two suggestions were made: treat all individually paid private premiums and Part B as a separate category of out-of-pocket expenditures, or disaggregate and identify the amount consumers pay for Part B premiums so that users could incorporate this category where they wished.

With respect to whether these expenditures should be considered public or private, the present system is consistent in its treatment of Part B premiums and Workers' Compensation; just like Part B of Medicare, the medical component of Workers' Compensation is treated as a public program even though most benefits are privately financed.

Allocating insurance deductibles

How a common insurance deductible is allocated across several services was of concern to some conference participants. It was recognized that there is no nonarbitrary method to allocate a common deductible, but the method HCFA uses (i.e., allocate in proportion to total expenditure on various services) might be better publicized.

Medicare and Medicaid buy-ins

Presently, Medicaid buy-ins to Medicare are shown as both Medicare and Medicaid expenditures, though there is no double counting in the total figure that is shown. HCFA indicated that the data are presented in this way to maintain consistency.

No change was recommended for this methodology of allocating the buy-ins.

Disaggregation of data base

Hospital care

The hospital care component of the personal health care services category currently includes hospital-based physician and dentist costs, as well as the salaries of medical and dental residents. One participant estimated that the inclusion of these two types of expenses overestimated expenditures on hospital services per se by about 14 percent in 1978. Some participants suggested that these expenses be excluded from the hospital care category and attributed to their respective categories (i.e., physician and dentist).

Some also suggested that the data on residents and full-time physicians be shown separately; this would permit a clearer picture of the direct cost of medical education.

It was recommended that hospital outpatient costs be presented separately from inpatient costs to provide a more accurate picture of what is occurring in these two facets of hospital care. This issue is discussed in greater detail in a later section of this summary.

Another recommendation regarding hospital care was to differentiate between short- and long-term hospitals. Some argued for differentiating patient care, teaching, and research costs, but allocation of joint costs would be necessarily arbitrary. No consensus was reached on the desirability of such a differentiation.

The disaggregation of room and board costs from ancillary services was suggested, as was a breakdown of ancillary services into laboratory, X-ray, and other categories.

The need to track hospital administrative costs was suggested in view of the increased complexity of the administrative requirements and the growth of the investor-owned segment of the hospital industry.

Some participants wished hospital profits disaggregated. It was pointed out that accounting profit does not generally respond to economic profit. No consensus was generated on this suggestion.

Physician services

Data on physicians in office-based private practice was requested by those interested in international comparisons. There was also special interest in disaggregation of services provided by such physicians to hospital inpatients and outpatients, because of the probable differential insurance coverage of such services.

There is a question whether residents and other physicians whose salaries are paid by hospitals should be counted as hospital costs or physician costs. Some participants argued that these salary costs should be counted as physicians costs. If so, the 1978 estimates for expenditures for physician services would be underestimated by at least 9 percent. The estimates for expenditures for physician services are based largely on data compiled by the Internal Revenue Service from business income tax returns.

Further disaggregations recommended were to separate ancillary services provided in the office and physicians' costs, and to further divide ancillary costs incurred in the office into laboratory and X-ray costs.

Nursing home care

The latest national nursing home survey (National Center for Health Statistics) was done in 1977. In light of the high growth rate of long-term care expenditure, updated information is important.

Participants recommended that nursing home data be disaggregated into data on skilled nursing facilities (SNF's) and intermediate care nursing facilities (ICF's). Information on a subset of ICF's, the intermediate care facility for the mentally retarded (ICF-MR), needs to be available because of the apparent recent growth in this type of facility and the effect such growth is having on other sections of the industry as beds are downgraded to ICF-MR status. Starting with the 1983 national health expenditures article (Gibson et al., 1984) these figures have been presented in the text of the article. The growth in the ICF-MR category, however, may reflect a shift of services from State budgets to the Federal budget by bringing previously provided services under the umbrella of the Medicaid program, i.e., there may be less growth in actual services than the ICF-MR expenditures suggest.

Drugs and medical sundries

Drug costs to hospital inpatients are currently allocated to hospital care. A study ot drug expenditures in the United States (Glarmet-Lenoir, and Herisson, 1980) by the Centre de Recherche pour l'Etude et l'Observation des Conditions de Vie estimated hospital drug expenditures for prescription drugs, in retail prices, at $5.5 billion in 1978 ($1.5 billion for outpatient and $4.0 for inpatient drugs). Some participants believed these expenditures should be treated as drug expenditures rather than as hospital expenditures. If these expenditures were to be so treated, hospital expenditures would have been overstated by 7.3 percent. HCFA suggested that this problem might be addressed by disaggregating hospital expenditures. Determining which drug cost is to be used in such a disaggregation is not straightforward: Is cost the ingredient cost, what the hospital paid for the drug, what a prescription would have cost on average in the private sector, what the hospital charges, or what is reimbursed? Hospital expenditure data now reflect hospital revenue; if drugs provided in the hospital are moved from hospital expenditure to drug expenditure, it seems appropriate to define the expenditure as what the hospital paid for the drug plus some inputed cost for dispensing. Any additional markup on drugs that was used to subsidize other hospital services would then be allocated to hospital services.

Private drug company research and development is now included with drug expenditure; this might be shown separately to permit a better estimate of the Nation's research effort.

Other supplies and professional services

Recommendations for disaggregating these data came from a number of participants, in particular that eyeglasses and appliances be differentiated. A source could be the Bureau of Labor Statistics' *Consumer Expenditure Interview Survey* that is issued periodically (approximately every 10 years) and includes the expenditure class, "nonprescription drugs and medical supplies."

Participants also suggested that other professional services be disaggregated into (at least) categories of chiropractors, optometrists, and other.

Outpatient services

The need to distinguish hospital outpatient from inpatient care was expressed by many conference participants. Medicare's prospective payment system for hospitalization provides incentives after admission for a hospital to offer as many services as possible on an outpatient basis, which underscores the interest in outpatient department care. The difficulty in comparing expenditures on hospital outpatient care with expenditures in other types of ambulatory care, given each hospital's individual cost allocation methods, was noted; in other words, a patient expenditure on hospital outpatient care may either subsidize or be subsidized by inpatient care.

Interest was also expressed in knowing the proportion of hospital outpatient versus inpatient services that are provided to health maintenance organization and preferred provider organization members.

Outpatient care expenditures on freestanding emergency centers, surgery centers, renal dialysis centers, and birthing centers, were also thought important to include. Such centers appear to be competing with hospitals for profitable types of services and are growing.

A data source for outpatient laboratory service is the journal *Laboratory Management* from United Business Corporation. It was suggested that this source could be validated through the use of Medicare's Part B claims data.

HCFA participated recently in a series of meetings to discuss revisions to the *Standard Industrial Classification* (SIC) (Office of the President, 1972), which provides the industry definitions most often used in data collection. Among the recommendations to be presented to the full SIC committee were several aimed at differentiating these types of establishments. Unfortunately, SIC revisions would not become evident for several years.

To segregate inpatient from outpatient data, it was suggested that a benchmark year be established, data collected, and alternative methods of allocation considered. Other data sources may need to be subsidized to obtain needed information and sample studies may need to be conducted to fill in the gaps.

Geographic disaggregation, small area statistics

Although the utility and reliability of small area statistics were questioned by some, a majority of participants expressed interest in small area statistics to permit better observation of changes in the delivery system, to learn about variations in practice patterns (e.g., between Medicare prospective payment system waiver States and nonwaiver States), and to help evaluate cost-containment efforts at the State and local level.

It was suggested that the personal health expenditures category be broken down to provide expenditure data by State, by service, and by Medicare, and that a time series be maintained.

HCFA noted that state estimates done in 1966 and 1969 are being updated with data through 1982 (Cooper, Gibson, Rice, 1982). HCFA will include Medicare tables adjusting expenditures from place of service to the residence of the beneficiary by state. Some participants expressed a desire to examine data both by place of service and place of residence (Levit et al., 1985).

HCFA is also currently working on a disaggregation of national health expenditures by age. A report has subsequently been published of 1977 and 1984 data showing a breakdown of expenditure by those 65 years of age and over but there is no age disaggregation for the under-65 years of age population (Gibson et al., 1984). Participants suggested age breakdowns for the categories 75-84 years and 85 years or over and expressed interest in having age data on an annual basis.

HCFA's Division of Information Analysis was recommended as an excellent source for small area statistics.

State and local government expenditures

An interest in knowing the proportions of health expenditures attributable to State and local government separately was expressed. This would be helpful if it could be presented on a State-by-State basis when HCFA publishes small area statistics. Such data currently come from the U.S. Bureau of the Census and are aggregated at HCFA. The importance of differentiating source when funds flow from the Federal to the State to local government levels was noted. It was observed that U.S. Bureau of the Census data show the distinction between direct and intergovernmental expenditures (*Governmental Finances*).

It was suggested that this separation of data into state and local government categories would be useful in addressing issues of municipal or county hospital bad debt and uncompensated care.

Philanthropy and industrial in-plant expenditure

It was suggested that these expenditures be disaggregated by type of service (Gibson et al., 1984). In Table 12 in the Winter 1984 article (Levit et al., 1985), the industrial in-plant expenditure was the $1.8 billion figure shown under other health services.

Program administration and insurance net cost

It was suggested that these two components be disaggregated for better international comparability.

This has been done. In Table 3 in the Winter 1984 article (Levit et al., 1985), for example, the net cost of health insurance (the $10.5 billion figure) appears as the private insurance portion of program administration and net cost of insurance. The net cost of insurance value, however, may be unreliable because of arbitrary allocations of joint costs and possible cross-subsidization of one line of business by another (e.g., life and health).

Health maintenance organizations

Because of the gains in enrollment of health maintenance organizations (HMO's), it was recommended that data on HMO's be shown separately in the article. Data on HMO's currently come from a survey sent to them by the Office of Health Maintenance Organization, Health Care Financing Administration; this survey does not now allocate costs to services. HMO's that use other hospitals for their inpatient care show that component as a separate category and HMO hospitals that admit patients from the community also segregate out expenditures by non-HMO members.

Mental health

Some argued for disaggregating mental health costs and showing them separately. One rationale is to track the effect of the deinstitutionalization movement on mental health budgets. It is easier to measure services provided by institutions; services and expenditures for those services at the community level are much more difficult to systematically measure and report.

A 1980 study of mental health and some substance abuse issues was cited as a possible source for some information (Alcohol, Drug Abuse and Mental Health Administration, 1980). Another source suggested was the National Institutes of Mental Health (NIMH) of the Public Health Service.

A question was raised regarding how the developmentally disabled population would be addressed in the context of mental health issues—in particular, would expenditure on the developmentally disabled be considered a mental health expenditure? There was no resolution of this issue.

Expansions of current data base

Costs of medical education

To have more complete information on health expenditures, it was recommended by participants that the costs of medical education outside hospitals be included in the annual article. Such data are now not included. Data are currently available for expenditures for medical schools but not for nursing schools or for other categories of allied health professions. Even including only medical schools would be better than complete exclusion.

Tax expenditures for health care

The possible presentation in the annual article of tax expenditure data and the value of the medical care deduction under the individual income tax was discussed. In effect, this issue relates to the sources of funds for medical care, for example, whether a component of private insurance premiums ought to be considered tax financed. *Tax Expenditures: Current Issues and 5-Year Budget Projections for Fiscal Years 1982-86* and the *Tax Expenditures: Current Issues and 5-Year Budget Projections for Fiscal Years 1984-88* from the Congressional Budget Office (CBO) estimate these expenditures; it is not clear that HCFA needs to play any additional role.

HCFA staff indicated a preference for relying on CBO and the Monthly Treasury Statement of Receipts and Outlays of the United States Government from the U.S. Department of the Treasury data for such information rather than incorporating them into the annual article.

Including eligibles for public programs

Including the number of eligibles for public programs in the annual article was raised for consideration. Without knowing the number of eligibles it is difficult to interpret trends in expenditure data for public programs. Whereas data pertaining to total national expenditures can be readily put on a per-person basis, data on public programs cannot.

There are, however, difficulties in determining the number of eligibles. Programs such as the Indian Health Service or the Veterans' Administration track people who receive services rather than people eligible for service, since the latter figure is unknown. Medicaid can provide a recipient count, but because people switch back and forth in their eligibility even during a year, it is nearly impossible to obtain unduplicated counts. As a limited step, however, some participants felt it would be easier to interpret the data on Medicare expenditure if HCFA published the number of enrollees in the annual article.

It was suggested that the 1980 National Medical Care Utilization and Expenditure Survey (National Center for Health Statistics and Health Care Financing Administration, 1980) or NMCES or other household surveys might provide such data on the number of eligibles.

Inclusion of malpractice premiums

A request was made to incorporate malpractice premium data into the annual report. Best Review: Property/Casualty Insurance Edition from A. M. Best Company, Inc. has some data on malpractice premiums, but these data are incomplete. One participant noted that a HCFA survey on physician practice costs and expenditures may provide information on malpractice premiums. Some argued that although such data were interesting, they were outside the scope of the annual article in the *Health Care Financing Review*.

Price indices and expenditure distributions

Some wished HCFA to make an effort to use Medicare claims data to calculate unit price indices; others suggested using Medicare claims data to estimate the cost of certain conditions; still others wanted simple distributions of gross expenditure. In general, it was felt that these also were subjects worthy of analysis, but that they should not be part of the annual article in the *Health Care Financing Review*.

Recommendations

Following are the recommendations and suggestions from the Conference on National Health Expenditures Accounting, October 11-12, 1984. The recommendations and suggestions do not take into account the costs of the changes; no attempt was made to estimate such costs. Any action based on these suggestions would, of course, consider the cost of implementation. "Desirability" is intended to mean only that there would be positive benefits from the change, not that the benefits would exceed the cost.

- Although data on nonhealth sector costs such as transportation costs and environmental health costs may well be significant, these should not be added to the expenditure series at this time.
- When previously published data are revised, it should be possible for the regular user to easily identify changes.
- When HCFA adjusts data, the assumptions on which the adjustments are made should be available to the users.
- Detail on data sources and assumptions made could be incorporated into a separate appendix made available to requesters.
- The need for survey data to validate and disaggregate the aggregate data HCFA now uses should be brought to the attention of the HCFA Data Policy Committee.
- The annual article should continue to use the calendar year, as opposed to other fiscal years, as the basis for the annual article.
- The development of an input-output table was regarded as desirable, resources permitting.
- If a capital account is constructed, it should include not only capital equipment but also investment in training and research.
- The method HCFA uses to allocate a common insurance deductible across several categories might be better publicized.
- It would be desirable to show data on residents and full-time physicians separately from other hospital costs.
- It would be desirable to separate inpatient and outpatient physician costs, as well as inpatient and outpatient hospital costs.
- It would be desirable to disaggregate expenditure on skilled nursing facilities and intermediate care facilities.
- To better estimate the Nation's research effort, it would be desirable to separate out the private drug company research, which is now currently included with drug expenditures.
- It would be desirable to disaggregate expenditures on eyeglasses and appliances.
- It would be desirable to disaggregate expenditure on other professional services such as chiropractors, optometrists, and others.
- It would be desirable to disaggregate personal health care expenditures by State and age. It would also be useful to include the age categories 75-84 years and 85 years or over.
- It would be desirable to show data on health maintenance organizations separately.
- It would be desirable to include costs of medical education that occur outside of hospitals.

There was no consensus on the following suggestions:

- Whether expenses for hospital-based physician and dentists and the salaries of medical and dental residents should be removed from the category of hospital care and attributed to their respective categories (i.e., physician and dentist).
- Whether expenditure on hospital care for short- and long-term hospitals should be differentiated.
- Whether expenditures for hospital room and board costs should be differentiated from ancillary costs, or whether ancillary costs should be disaggregated into laboratory, X-ray, and other categories.
- Whether nursing home construction costs should be disaggregated from other facility construction costs.
- Whether drug costs currently allocated to hospital inpatients should be reallocated to the drug category.

Technical note

List of attendees with affiliation at the time of the conference

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David Dolkart
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Dean Farley
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Roger Feldman
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Robert B. Helms
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Charles Fisher
Mark Freeland
Guy King
George Kowalczyk
Helen Lazenby
Katharine Levit
Pat McDonnell
George Schieber
Sally Sonnefeld
Daniel Waldo
Patricia Willis

Topics for discussion

The following was sent to participants in advance and constituted an agenda:

1. We will begin with those suggestions made in the article, "Estimating the direct costs of illness," (Scitovsky 1982). Many of those suggestions were brought up by others as well. The first set of suggestions relates to reclassification of existing expenditures. For example, Scitovsky suggests the allocation of hospital-based physician costs to physicians (and similarly for hospital-based dentists). While discussing the allocation of hospital-based physician charges, we should touch on "the cost of medical education." There are some theoretical problems with defining the cost of medical education, but this concern does suggest at a minimum breaking apart hospital based physician costs and breaking them in turn into full time staff and resident costs. Should that much be done? Is it feasible or desirable to do more? Scitovsky also suggests that the cost of drugs given in the hospital and nursing homes be allocated to drugs. More generally, can drugs dispensed outside retail outlets be allocated to categories other than drugs?
2. Some participants raised the issue of the boundaries of the health sector. There are several possibilities for expansion: custodial services for the chronically ill; other private expenditures that are not spent within the health sector such as transportation to the provider, cost of special diets, etc.; and public expenditures on the environment including air and water. There is concern about including institutions that are emerging in the grey area between inpatient and oupatient care such as surgicenters and urgicenters. To what degree are such institutions included in the existing data? If they are not included, does the American Hospital Association have any

plans for collecting data in this area? Is anyone else collecting data?

3. Some have argued that estimates for noninstitutional services are biased downward (Scitovsky, 1982). To what degree is this the case? If it is the case, what can and should be done about it? In particular, suppose it is generally agreed that there is a downward bias in a figure, but the bias cannot be estimated from data. Should HCFA add an explicit judgmental adjustment to the estimates so that the estimates reflect a "best" estimate? There are clear analogies to the U.S. Bureau of the Census problem with respect to assumed undercounts.

4. A third set of suggestions has to do with more disaggregation of existing data. For example, hospital data might be disaggregated by control, service, and stay, as well as by inpatient and outpatient services. Further, long-term care units in hospitals could be identified. One can raise the question of how hospitals should be aggregated; what are the conceptual bases for grouping certain types of hospitals with others? Could physician services be disaggregated into inpatient and outpatient services? Because they are insured to different degrees, an increase in insurance coverage is likely to affect outpatient physician services more than inpatient and conversely. Perhaps estimates could be constructed from the National Medical Care Expenditure Survey. Should home health care be accounted for separately? Can laboratory work be accounted for separately?

5. Several respondents suggested a confusion between stocks and flows in the current system and the apparent double counting of construction expenditure. The double counting occurs because in cases other than donated capital, charges for capital embodied in construction will presumably be passed on and be reflected in revenues. The current treatment is, however, consistent with national income accounting.

6. Some respondents suggested an asset account. In this case, the notion of keeping hospital and nursing home construction separate appears to have merit. An apparent inconsistency between including hospital construction, but not medical office building construction, was also noted.

7. Any number of people would like small area statistics. Some talk about regional data, some about State data. Some also suggest data sorted by site of provider and residence of patient. Although one can see any number of uses for such data, little is known about the costs of generating them. One suggestion was that the Medicare claims data by State could be provided on a more frequent basis than is currently done.

8. Some individuals would like the financing of care for the mentally ill kept as a separate category.

9. Some suggest including tax expenditure, both the deduction for health insurance and the deduction for medical expenditure. That is, these categories would be shown as public expenditure (presumably in a separate category), and private expenditure would be correspondingly reduced.

10. Should State and local government expenditure be separated?

11. Should sources of funds for construction, including bonds and guaranteed loans, be included? Should the value of the guarantee be imputed as an expenditure?

12. Should research expenditure be disaggregated into public and private components?

13. How should expenditures that are partially financed by an insurance policy with a common deductible be allocated among uses? In principle, any answer would have to be arbitrary. Some discussion might nonetheless be useful. An example of the problem is as follows: Suppose an individual has a policy with a $200 deductible. That person spends one night in a hospital at $500 and has physician bills of $500. Insurance pays $800 of the $1,000 total; the person pays $200. What percentage of the hospital expenditure is credited to private health insurance and what percentage to direct payment? What percentage of physician expenditure?

14. Should annual revisions in the data be given greater prominence?

15. Are the adjustments to the Internal Revenue Services data on physicians still appropriate? Would the American Medical Association data be a better source for physician data on income?

16. Are the Bureau of Economic Analysis data the best source for drugs and drug sundries, and eyeglasses and appliances?

17. Is anything known about the magnitude of error introduced into the data from trying to combine one source of data with another?

18. Can financial and clinical information be married to produce cost of disease estimates? Should they be? Somewhat along the same vein, should anything be provided about the distribution of expenditure?

19. Is the value provided for construction inconsistent by applying only to structures and not to equipment?

20. Should the profits and reserves of private insurance carriers be disaggregated from other prepayment and administration costs? Among other things, this might lead to better international comparability.

21. Is more detail on data sources, assumptions, and calculations needed?

22. Would fiscal year data as well as calendar year data be useful?

23. Should the Part B Medicare premium be considered a private expenditure?

24. Present practice is to consider Medicaid buy-ins into Medicare as both Medicaid and Medicare expenditure (though there is no double counting in the total figure). Should this practice be changed?

25. Would more frequent breakdowns of expenditure by age group be useful?

26. Should HCFA make an effort using Medicare claims to calculate unit price indices?

27. Should eligibles for public programs be included?

28. Should data on malpractice premiums be included? If so, how would one decide which types of inputs that physicians or hospitals spend money on should be included?

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Legislative Update

Summary of fiscal year 1987 proposals

Medicare

Reimbursement for prospective payment system (PPS) and PPS-exempt hospitals: Projects an update factor less than the hospital market basket in fiscal year 1987 of 2 percent (subject to change) for the increase in payments to PPS and PPS-exempt hospitals. For future years, the rate of increases is assumed to be equal to the hospital market basket. (Regulation)

Include capital in PPS payments: A national prospectively determined per-case payment for hospital capital costs would be phased in over 4 years with gradual elimination of payments for return on equity and interest offsets. (Regulation)

Eliminate doubling for indirect medical education factor: Eliminates doubling of the indirect medical education adjustment factor so that hospitals would receive an adjustment not to exceed 5.795 percent. (Legislation) Refines the current formula for calculating the adjustment factor to reflect the declining marginal cost of interns and residents in training programs. (Regulation)

Reform payments for direct medical education: Eliminates Medicare direct medical education payment for nursing and allied health education, and classroom-related expenses. Replaces the reasonabale cost-reimbursement methodology with payment to each hospital at the lesser of (1) its allowable costs, or (2) the product of its hospital-specific per resident amount and its number of interns and residents. (Regulation)

Modify return on equity for facilities other than inpatient hospitals: Reduces the rate of return on equity for skilled nursing facilities and outpatient hospital departments; eliminates return on equity for all other nonhospital proprietary providers; and eliminates exception from the home health agency cost limits for new facilities. (Regulation)

Eliminate favorable presumption of nonliability: Eliminates the use of performance-based administrative presumptions to determine provider liability for noncovered items or services, and requires that such determinations be made on the basis of claim-by-claim review. (Regulation)

Home health utilization: Requires Medicare contractors to implement medical review/utilization review activities focused on the utilization of home health services. (Administrative)

Reform Medicare physician payments:

Reduce payments for overpriced procedures—Targets for reduction, based on inherent reasonableness authority, payments for selected physicians' procedures overpriced as a result of technological advances or geographic price variations. (Regulation)

Reduce payments for standby anesthesia—Payments to physicians who provide standby anesthesia services would be limited. (Regulation)

Limit payments for assistants-at-surgery—Eliminates inappropriate payments for assistants-at-surgery by specifying the procedures for which they would not be covered without specific justification as to medical necessity. (Regulation)

Limit post-cataract surgery payment—Requires prepayment screens to review the medical necessity of replacement cataract contact lenses, and requires carriers to use the inherent reasonableness authority in setting reasonable charges for prosthetic lenses and related professional services. (Regulation)

Correct overstatement of Medicare Economic Index—Corrects an overstatement of the Medicare Economic Index (MEI) through a one-time adjustment that substitutes the "rental equivalence" housing component of the Consumer Price Index for the inflated home ownership approach. (Regulation)

Expand limits on nonphysician services: Expands the list of nonphysician, nonlaboratory Part B services, supplies and equipment subject to lowest charge level limits, and applies inherent reasonableness to payments for certain other Part B services. (Regulation)

Maintain clinical laboratory fee schedules: Maintains for 1 year the clinical laboratory fee schedules established by the Deficit Reduction Act of 1984 for independent laboratories, physicians' office laboratories, and hospital outpatient laboratories. (Legislative) Limits payment for services furnished by a hospital laboratory to outpatients of the hospital. (Regulation)

End-stage renal disease (ESRD) payment rate calculation: Provides for updating ESRD physician and facility payment rates by using more recent data on facility and treatment mix and physician visits. (Regulation)

Eliminate End-Stage Renal Disease (ESRD) Networks: Removes the requirement for End-Stage Renal Disease Network Coordinating Councils. In fiscal year 1986, the number of ESRD Networks should be reduced by regulation. (Legislative and Regulation)

Make Medicare secondary payer for working aged over age 69: Eliminates the current limit of age 70 on workers and spouses who are subject to the Medicare working aged provisions. (Legislation)

Make Medicare secondary payer to employer group health insurance covering disabled Medicare beneficiaries: Makes Medicare secondary payer when disabled beneficiaries or their spouses have employer group health coverage. (Legislation)

Raise Part B premium: Increases over 5 years the Part B premium to 35 percent of program costs. Increases the premium to 50 percent of program costs for beneficiaries whose premiums are paid by third parties. (Legislation)

Raise Part B deductible to $100 and index to the Medicare Economic Index: Increases the Part B deductible to $100 in 1987 and provides for future increases rounded to the nearest whole dollar based on annual changes in the Medicare Economic Index. (Legislation)

Establish a copayment for home health visits: Establishes a copayment for certain home health visits equal to 1 percent of the inpatient hospital deductible. (Legislation)

Require standard coinsurance and deductible on ambulatory surgical center facility services: Requires Medicare beneficiaies to pay the standard Part B deductible and coinsurance on facility charges for services received in ambulatory surgical centers. (Legislation)

First full month, Medicare entitlement: Begins Medicare entitlement in the month following the month that the beneficiary meets all requirements. (Legislation)

Medicare voucher: Establishes a voluntary voucher system to allow beneficiaries the option of using their Medicare benefit to enroll in a wider array of private health plans. (Legislation)

Medicare contractor initiative: Provides increased administrative flexibility in the procurement of Medicare claims processing services, and eliminates the Part A intermediary nomination process. (Legislation)

Simplify processing of Part A bills: Allows the payment of certain Part A bills in the order in which they are submitted. (Legislation)

Eliminate requirement for a separate Railroad Retirement Board contractor: Eliminates the statutory requirement for a separate contractor to process Part B claims for Railroad Retirement Board beneficiaries, and assigns these claims to the local carriers. (Legislation)

Medicaid

Cap Medicaid benefit expenditures: Places a cap on fiscal year 1987 Federal Medicaid expenditures with future payments indexed to the Medical Care Component of the Consumer Price Index. Establishes a hardship pool for States exceeding the cap and provides greater flexibility to States in designing thei programs. (Legislation)

Medicaid administrative match reform: Eliminates enhanced match rates for State administrative costs by establishing a uniform basic rate of 50 percent and further reduces match rates for States with high administrative costs. (Legislation)

Second surgical opinion and inpatient hospital pre-admission review: Requires States to implement approved programs for mandatory second surgical opinions and inpatient hospital preadmission review. (Regulation)

Medicaid prescription drug reimbursement reform: Proposes three options for achieving program savings through reform in Medicaid drug reimbursement. (Regulation)

Third-party liability regulations: Strengthens the third-party liability collection activities by increasing the collection of health insurance information and performing data matches to identify liable third parties. (Administrative and Regulation)

Survey and certification of long-term care facilities, including (ICF's/MR): Proposes aggressively expanding Federal review of State survey and certification activities, with highest priority assigned to ICF's/MR. (Regulation and Administrative)

Disallowances of Medicaid funds for vocational and education activities in ICF's/MR: Proposes management initiatives to ensure that educational and vocational activities in ICF's/MR are not reimbursed inappropriately by the Medicaid program. (Administrative)

Health Care Financing Trends

Medicare prospective payment system: Length of stay for selected diagnosis-related groups

by Wayne Callahan and Tim Lawrence

Anecdotal reports have been cited in the media that allege that hospitals and physicians are using published Medicare average (mean) lengths of stay as maximum allowable lengths of stay. These reports indicate that when the mean length of stay for a particular diagnosis-related group (DRG) is reached, some providers recommend discharge from hospitals. However, based on nationally aggregated length-of-stay information, no evidence exists that this practice is widespread. As shown in the following tables and figures, substantial proportions of discharges have lengths of stay exceeding the geometric mean; also, no unusual discharge activity occurs in the vicinity of the geometric mean, either before it or after it.

A listing of the 25 most frequently occurring DRG's in fiscal year 1986 to date is provided in Table 1. Selected mean lengths of stay and percentiles based on live discharges in calendar year 1984 for these DRG's are presented in Table 2. The frequency distribution by length of stay (up to 30 days) for all DRG's is shown in Figure 1. This is followed by frequency distributions by length of stay for 10 selected DRG's (Figures 2-11). In each figure, the 1983 geometric mean is superimposed on the frequency distribution for the DRG. The 1983 geometric mean length of stay was published in the *Federal Register*, September 1, 1983, and it is the most frequently quoted mean.

Table 1

Rank of the most frequently occurring diagnosis-related groups in fiscal year 1986 to date

Fiscal year 1986 rank	Fiscal year 1984 rank	Diagnosis-related group number	Description
1	1	127	Heart failure and shock
2	5	140	Angina pectoris
3	2	182	Esophagitis, gastroenteritis, and miscellaneous digestive disorders, age over 69 and/or complicating conditions
4	4	014	Specific cerebrovascular disorders except transient ischemic attacks
5	6	089	Simple pneumonia and pleurisy, age over 69 and/or complicating conditions
6	8	138	Cardiac arrhythmia and conduction disorders, age over 69 and/or complicating conditions
7	10	296	Nutritional and miscellaneous metabolic disorders, age over 69 and/or complicating conditions
8	14	209	Major joint and limb reattachment procedures
9	13	336	Transurethral prostatectomy, age over 69 and/or complicating conditions
10	12	096	Bronchitis and asthma, age over 69 and/or complicating conditions
11	11	015	Transient ischemic attacks
12	7	243	Medical back problems
13	9	088	Chronic obstructive pulmonary disease
14	17	320	Kidney and urinary tract infections, age over 69 and/or complicating conditions
15	15	174	Gastrointestinal hemorrhage, age over 69 and/or complicating conditions
16	16	122	Circulatory disorders with acute myocardial infarction, without cardiovascular complications, discharged alive
17	22	121	Circulatory disorders with acute myocardial infarction and cardiovascular complications, discharged alive
18	23	148	Major small and large bowel procedures, age over 69 and/or complicating conditions
19	20	210	Hip and femur procedures except major joint, age over 69 and/or complicating conditions
20	19	294	Diabetes, age over 35
21	18	468	Unrelated operating room procedure
22	29	410	Chemotherapy
23	30	141	Syncope-collapse, age over 69 and/or complicating conditions
24	40	430	*Psychoses*
25	33	125	Circulatory disorders, except acute myocardial infarction, with cardiac catheter, without complex diagnoses

SOURCE: Health Care Financing Administration, Bureau of Data Management and Strategy: Case-mix monitoring tables using bill records processed through January 31, 1986.

Table 2

Selected mean lengths of stay and percentiles based on live calendar year 1984 prospective payment system discharges for the most frequently occurring diagnosis-related groups in fiscal year 1986 to date

Fiscal year 1986 rank	Diagnosis-related group number	Geometric mean[1]	Arithmetic mean	Standard deviation	Selected percentile				
					10th	25th	50th	75th	90th
Total	—	—	7.6	7.0	1.9	3.2	5.8	9.8	15.2
1	127	7.8	7.7	5.6	2.8	4.2	6.4	9.5	14.1
2	140	5.5	5.0	3.4	1.9	2.8	4.3	6.3	8.8
3	182	5.4	5.4	4.2	1.8	2.9	4.4	6.8	10.0
4	014	9.9	10.4	8.4	3.1	5.2	8.4	13.1	19.6
5	089	8.5	8.5	5.2	3.5	5.0	7.3	10.4	14.9
6	138	5.7	5.6	4.2	1.7	2.8	4.5	7.0	10.3
7	296	7.3	7.0	5.8	2.3	3.6	5.6	9.0	13.1
8	209	17.1	14.4	6.7	8.5	10.4	13.1	16.4	21.1
9	336	8.4	7.3	4.5	3.8	4.8	6.2	8.4	12.0
10	096	6.9	6.6	4.5	2.6	3.8	5.6	8.1	11.5
11	015	5.6	5.1	4.0	1.7	2.6	4.2	6.5	9.5
12	243	7.5	7.1	5.0	2.2	3.7	6.0	9.0	13.0
13	088	7.5	7.5	6.3	2.7	4.0	6.2	9.1	13.4
14	320	7.0	7.2	5.0	2.8	4.1	6.1	8.9	12.6
15	174	6.7	6.6	4.8	2.4	3.7	5.5	8.2	11.8
16	122	9.8	9.3	5.0	3.2	6.2	9.0	11.8	14.6
17	121	11.9	11.7	7.0	4.6	7.6	10.6	14.2	19.3
18	148	17.0	16.4	9.6	8.6	10.5	13.8	19.2	26.6
19	210	17.8	14.7	8.2	7.7	10.0	13.2	17.1	22.8
20	294	7.7	7.4	4.9	2.8	4.2	6.4	9.0	12.8
21	468	11.2	13.3	11.4	3.0	5.9	10.5	17.1	26.2
22	410	2.6	3.0	2.7	0.7	1.6	2.3	4.2	5.7
23	141	5.0	5.0	3.8	1.6	2.6	4.1	6.2	9.1
24	430	10.8	11.8	10.7	2.5	4.7	8.7	15.4	24.6
25	125	5.0	3.5	3.3	1.3	1.7	2.3	4.1	7.5

[1] As published in the *Federal Register*, September 1, 1983.

Figure 1
Distribution of live prospective payment system discharges for all diagnosis-related groups, by length of stay: Calendar year 1984

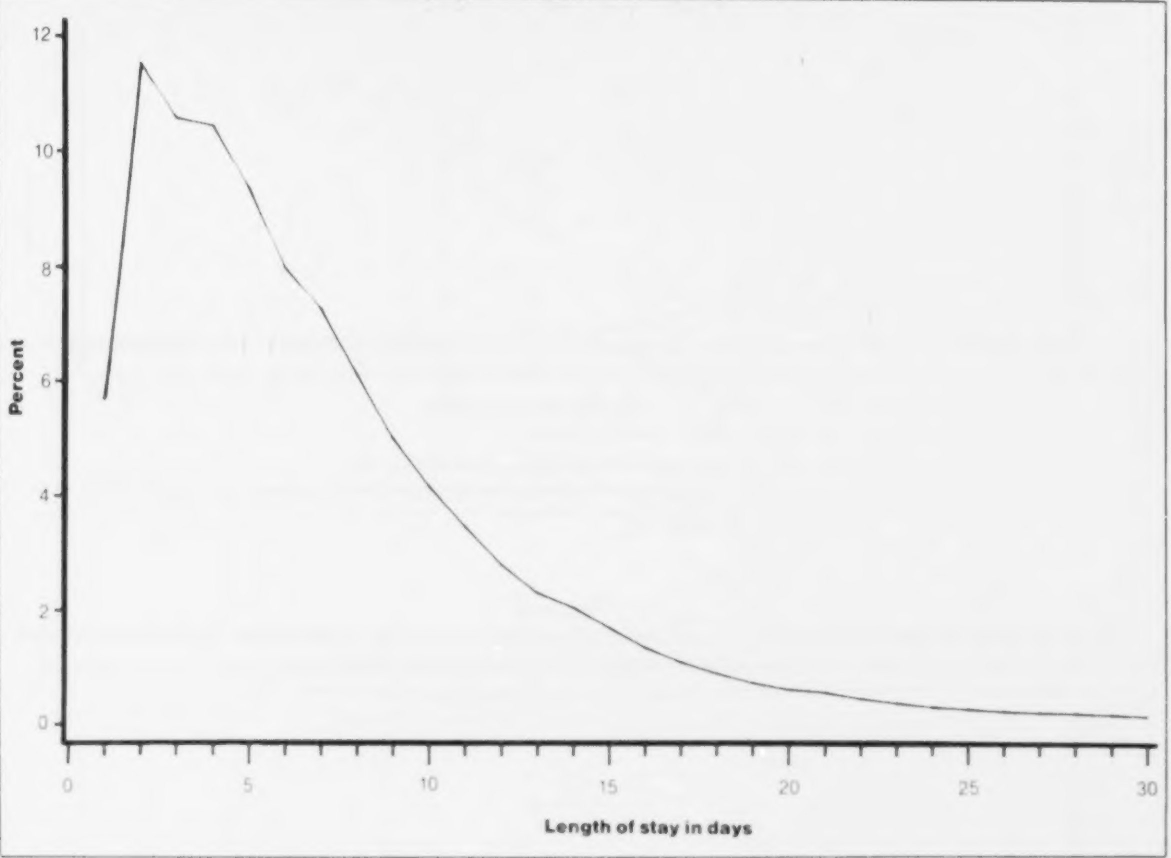
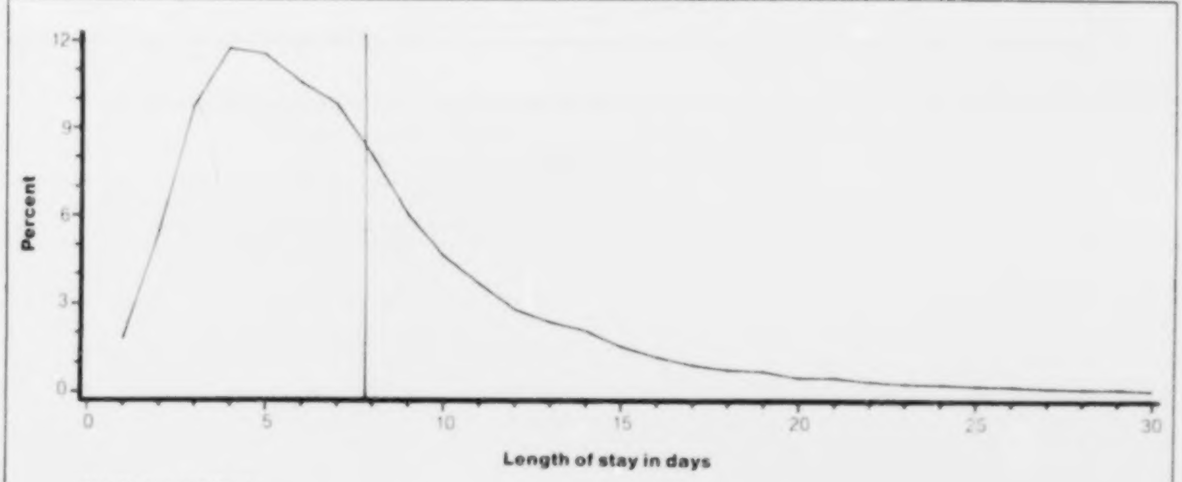


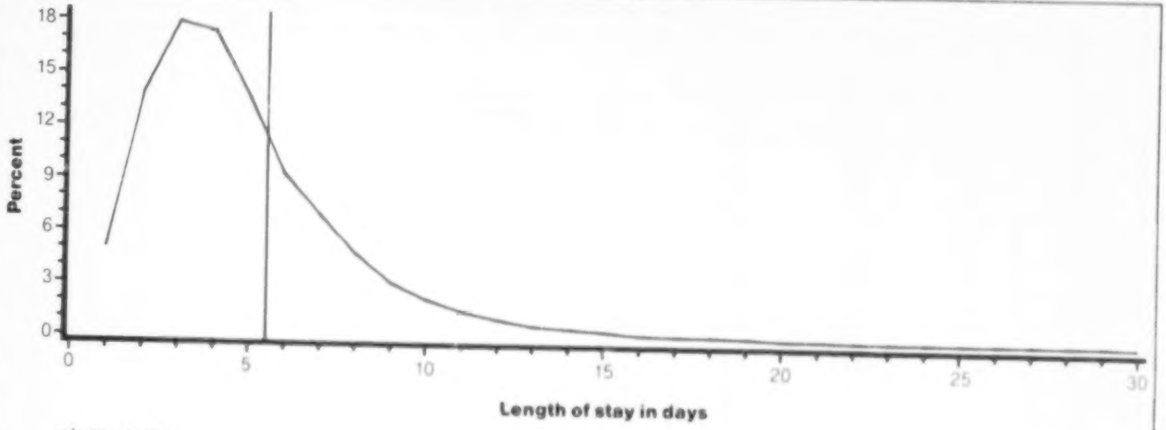
Figure 2
Distribution of live prospective payment system discharges for diagnosis-related group 127,[1] by length of stay: Calendar year 1984



[1] Heart failure and shock.

NOTE: Vertical reference line is geometric mean as published in *Federal Register*, September 1, 1983.

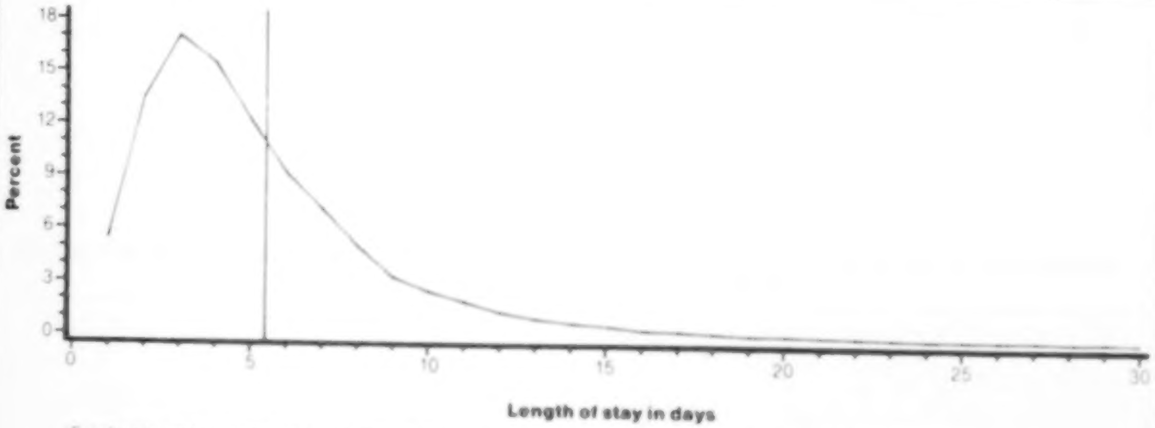
Figure 3
Distribution of live prospective payment system discharges for diagnosis-related group 140,[1] by length of stay: Calendar year 1984



[1] Angina pectoris.

NOTE: Vertical reference line is geometric mean as published in *Federal Register*, September 1, 1983.

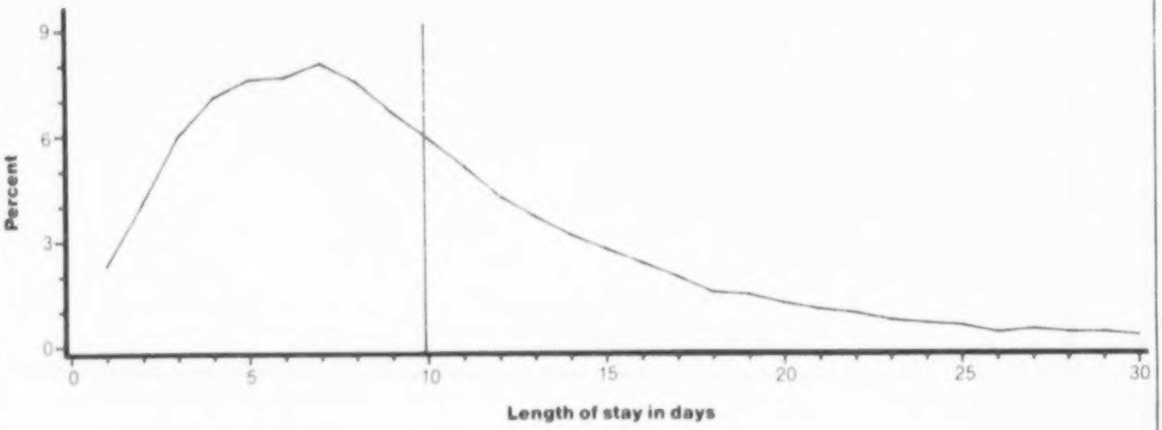
Figure 4
Distribution of live prospective payment system discharges for diagnosis-related group 182,[1] by length of stay: Calendar year 1984



[1] Esophagitis, gastroenteritis, and miscellaneous digestive disorders, age over 69 and/or complicating conditions.

NOTE: Vertical reference line is geometric mean as published in *Federal Register*, September 1, 1983.

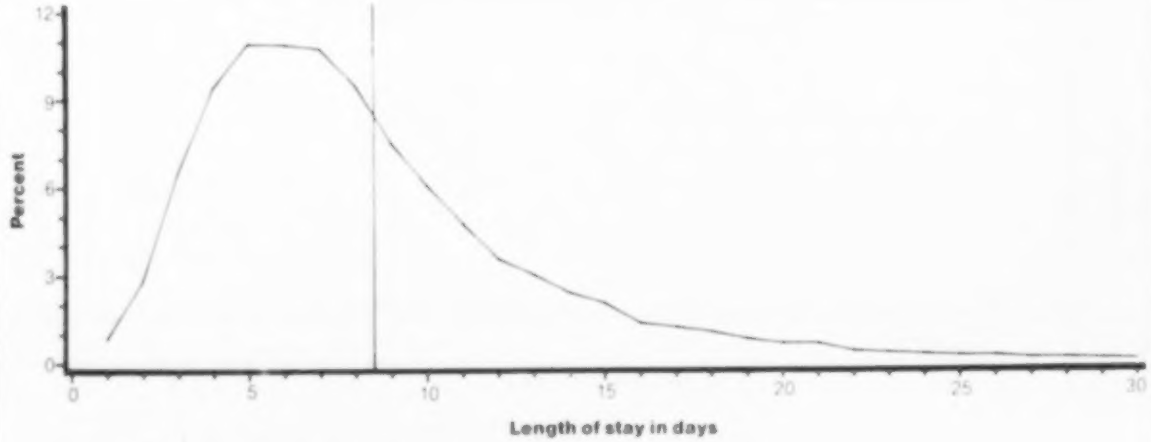
Figure 5
Distribution of live prospective payment system discharges for diagnosis-related group 014[1] by length of stay: Calendar year 1984



[1] Specific cerebrovascular disorders except transient ischemic attacks

NOTE: Vertical reference line is geometric mean as published in *Federal Register*, September 1, 1983.

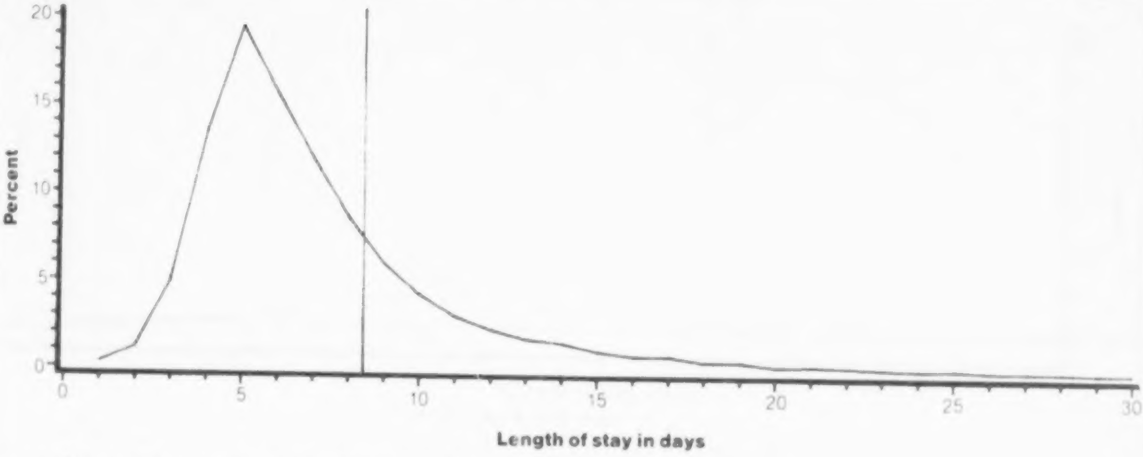
Figure 6
Distribution of live prospective payment system discharges for diagnosis-related group 089[1] by length of stay: Calendar year 1984



[1] Simple pneumonia and pleurisy, age over 69 and/or complicating conditions.

NOTE: Vertical reference line is geometric mean as published in *Federal Register*, September 1, 1983.

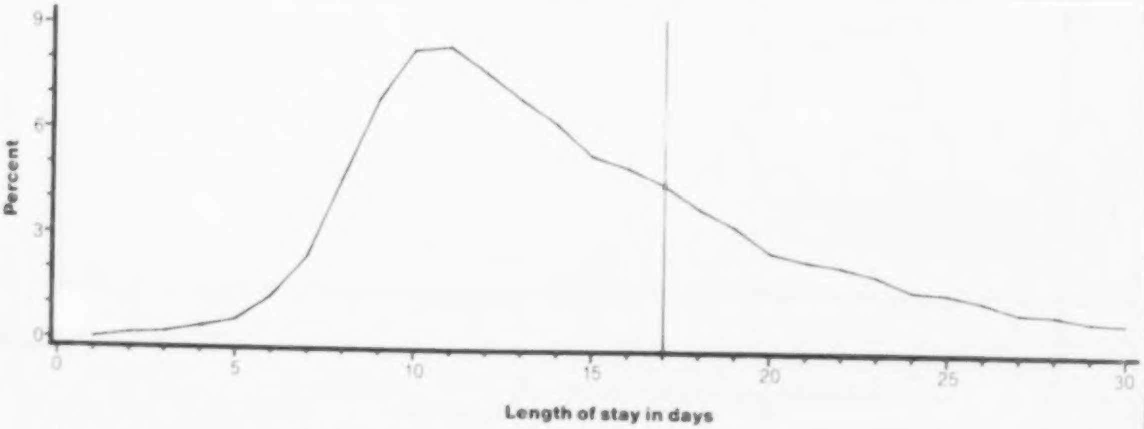
Figure 7
Distribution of live prospective payment system discharges for diagnosis-related group 336,[1] by length of stay: Calendar year 1984



[1] Transurethral prostatectomy, age 69 and/or complicating conditions.

NOTE: Vertical reference line is geometric mean as published in *Federal Register* September 1, 1983.

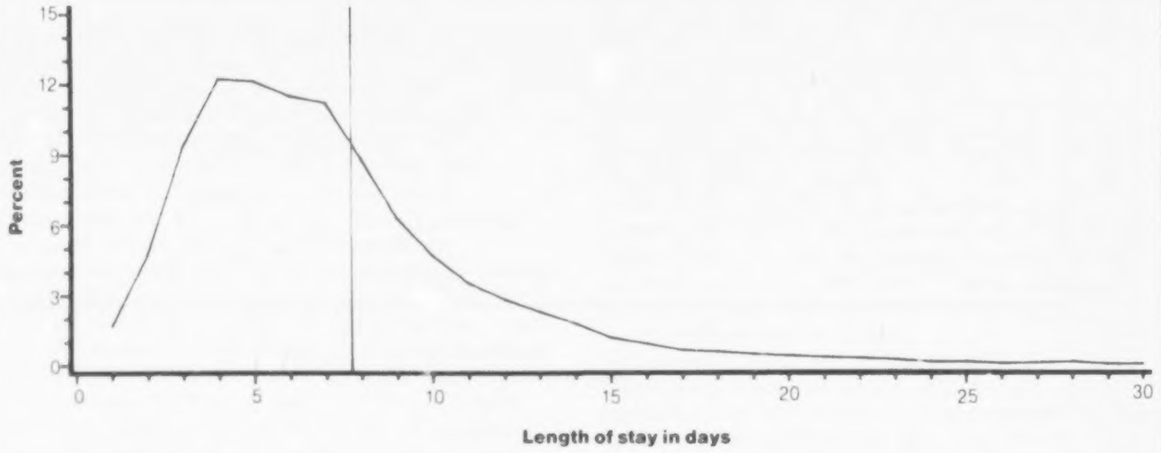
Figure 8
Distribution of live prospective payment system discharges for diagnosis-related group 148,[1] by length of stay: Calendar year 1984



[1] Major small and large bowel procedures, age over 69 and/or complicating conditions.

NOTE: Vertical reference line is geometric mean as published in *Federal Register* September 1, 1983.

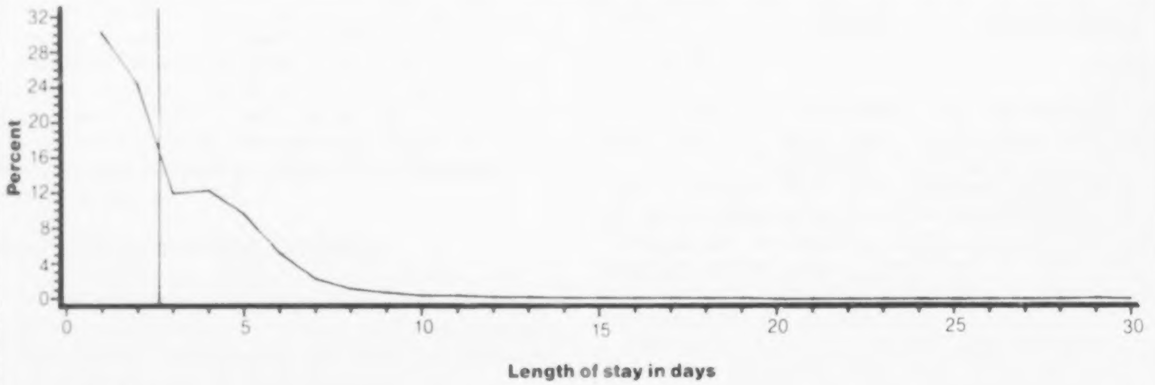
Figure 9
Distribution of live prospective payment system discharges for diagnosis-related group 294,[1] by length of stay: Calendar year 1984



[1] Diabetes, age over 35.

NOTE: Vertical reference line is geometric mean as published in *Federal Register*, September 1, 1983.

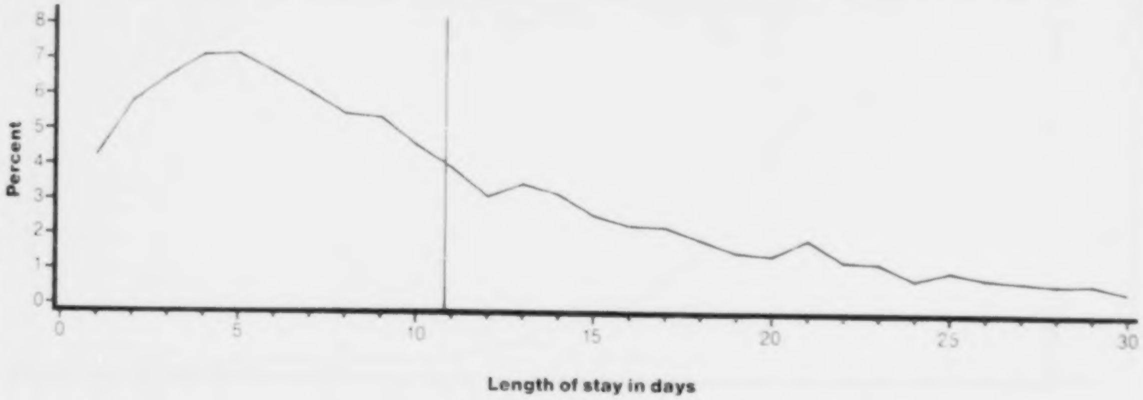
Figure 10
Distribution of live prospective payment system discharges for diagnosis-related group 410,[1] by length of stay: Calendar year 1984



[1] Chemotherapy.

NOTE: Vertical reference line is geometric mean as published in *Federal Register*, September 1, 1983.

Figure 11
Distribution of live prospective payment system discharges for diagnosis-related group 430[1] by length of stay: Calendar year 1984



[1] Psychoses

NOTE: Vertical reference line is geometric mean as published in *Federal Register*, September 1, 1983.

News Briefs

ICD-9-CM Coordination Committee meets

The second meeting of the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) Coordination and Maintenance Committee was held on January 22-23, 1986. This Committee was established to review modifications of the ICD-9-CM that reflect new procedures and technologies, as well as newly identified diseases and coding problems. It was also established to promote the use of educational programs and other communication techniques toward standardizing coding applications and upgrading the quality of coded medical data. The meeting was co-chaired by the National Center for Health Statistics (NCHS) and the Health Care Financing Administration (HCFA). It was attended by Federal Committee members and approximately 50 people from public and private health-related organizations, as well as interested persons from the general public.

The Committee reviewed proposals for new or modified technologies to be added to ICD-9-CM codes. These new technologies included: cardioverter/defibrillator implant, thoracoabdominal aneurysm repair, cochlear implant, lithotripsy, percutaneous transluminal coronary angioplasty, and magnetic resonance imaging. The classification of acquired immune deficiency syndrome (AIDS) in ICD-9-CM, Volume 1 (diseases), was also discussed. HCFA and NCHS will work with the Center for Disease Control to develop a recommendation for AIDS codes.

Individuals interested in the work of the Committee should contact Shelia Sanders at (301) 594-9455 or Lisa Levine at (301) 597-0610, of the Office of Information Resources Management, Bureau of Data Management and Strategy, Health Care Financing Administration.

Long-term care report available

The Final Report of the Evaluation of Coordinated Community-Oriented Long Term-Care Demonstration Projects is now available from the Office of Research and Demonstrations. In 1980, the Health Care Financing Administration sponsored a national evaluation of 13 projects demonstrating the provision of coordinated, community-oriented services to impaired and aged Medicare and Medicaid beneficiaries. These projects provided long-term care under section 222 Medicare and/or section 115 Medicaid waivers that permitted reimbursement for clients and for services not typically covered by Medicare and/or Medicaid. The projects tested whether different methods of case-managed, coordinated delivery of community-oriented health and social services resulted in the more cost-effective use of both institutional and noninstitutional long-term care.

Berkeley Planning Associates of Berkeley, California, with the assistance of two subcontractors, the Western Center for Health Planning in San Francisco and the Rehabilitation Research and Training Center in Aging at the University of Pennsylvania, studied 13 demonstration projects but concentrated most of the evaluation resources on an indepth study of 6 of the projects (the sixth project will be completed in July 1986). Various models of community care were identified and compared with the traditional service system.

In general, it was found that projects designed to upgrade the traditional home care package were not successful; few differences in impact and cost between traditional care and these projects were found. The most successful models for emulation that emerged from the study were those that controlled access to institutional services (pre-admission screening) and those that consolidated all services into a single agency.

For additional information or copies of the final report or executive summary, contact the Project Officer, Kathy Ellingson, 2-F-3 Oak Meadows Building, 6325 Security Boulevard, Baltimore, Maryland 21207, (301) 597-2305.

New journal on ambulatory care marketing available

The *Journal of Ambulatory Care Marketing* covers marketing of a broad range of ambulatory health care services, including traditional emergency care, urgent/covenient care, group practices providing emergency/ambulatory health services, surgicenters, industrial and occupational health care, and others providing services such as health maintenance organizations, independent practice associations, and preferred provider organizations.

The journal features applied strategies, plans, approaches, programs, and tactics developed by marketing professionals, with an emphasis on assessment and accountability. Articles are being solicited that identify common strategies and plans that help organize, attract, and manage the consumer markets for ambulatory health care services, and also determine more accurately the professions and delivery systems that provide ambulatory care services. Topics of interest include emergency care as the "gatekeeper" function for hospitals, urgent/convenient care as decentralized noncritical medicine, new roles of industrial medicine for ambulatory health services, the role of the primary care group, and surgicenters as channel control devices.

Prospective authors may request an "Instructions for Authors" brochure from Robert E. Sweeney, Editor, *Journal of Ambulatory Care Marketing*, California Emergency Physicians Medical Group, 440 Grant Avenue, Oakland, California 94610.

Subscription rates are $32 for individuals (special $4 introductory discount on prepaid and credit card orders), $48 for institutions, and $60 for libraries. United States residents, add $2 for postage and handling. Canadian/Mexican residents, add $7 for postage and handling. Foreign subscriptions rates are $48.40 for individuals, $67.60 for institutions, and $82 for libraries (postage and handling included).

HMO report available

National HMO Firms, 1985, a new report by InterStudy, supported by the Henry J. Kaiser Family Foundation and the John A. Hartford Foundation of New York City, concludes that tremendous growth of health maintenance organizations (HMO's) has been fueled by the HMO industry's continuing shift away from small independent HMO's toward multi-state networks of HMO's linked by common ownership or management. These national HMO firms now control a substantial share of the HMO industry. The report is based on information contained in InterStudy's longitudinal HMO data base, and includes a complete listing of the 24 national HMO firms and their affiliated HMO's, as well as a mailing list with headquarters addresses and top officers.

Cost of the 68-page report is $50.00. For information, please contact Dari Holmes, InterStudy, P.O. 458, Excelsior, Minnesota 55331, (612) 474-1176.

Health care grants directory available

The *Directory of Biomedical and Health Care Grants* contains 1,358 health-related funding programs ranging from laboratory investigations to programs that are designed to study the needs of society in health care delivery. Special efforts have been made to increase coverage of such areas as clinical and programmatic studies in gerontology and mental health; clinical studies of the cause, detection, and elimination of cancer; health care delivery and maintenance; and epidomiological studies of infectious diseases. Each program listed in the main section of the directory contains an annotation describing the program's focuses and goals, program requirements listing eligibility statements, program restrictions listing exclusions, contacts, and deadlines, and funding amounts.

By using this directory, those researchers seeking funding may match the needs of their particular programs with those sponsors offering funding programs in the researchers' areas of interest. The current information listed in this directory is meant to eliminate the cost being incurred by both researcher and sponsor when proposals are submitted which are inappropriate for a sponsor's funding program.

The cost of the directory is $55. For ordering information, please contact Oryx Press Customer Service, 2214 North Central at Encanto, Phoenix, Arizona 85004-1483, (602) 254-6156.

Collection of medical articles available

By the London Post: Essays on Medicine in Britain and America, by John Lister, has been produced by the publishers of *The New England Journal of Medicine*.

This collection of articles, which are selections of essays chosen by the author from his monthly column that appeared from 1952 to 1980, provide the reader with a common-sense chronicle of medical and sociological events in Great Britian, including the evolution of the National Health Service.

The book addresses current issues affecting medical information and delivery systems such as the training of general practitioners versus specialists, the changing balance between physicians in private practice and those employed in group practices and by larger organizations, the emergence of alternative medical settings, and the expanding roles of health care providers other than physicians.

Each reprinted column is prefaced with a short commentary that highlights the major points of the article. A name-subject index adds to the utility of this most readable and thought-provoking volume.

This book will be of interest to physicians, other health care providers and administrators, health policy planners, and informed health care consumers.

Cost is $13.95 for the 248-page book. Order number is ISBN: 0-190133-13-1. To order, contact: Wendy P. Faxon, Manager, Publications Development, *The New England Journal of Medicine*, 1440 Main Street, Waltham, Massachusetts 02254.

AIDS videotape addresses hospitals' fears

"Fear of Caring," a 20 minute, in-service videotape for training hospital employees, was part of the live broadcast of the American Hospital Association's national teleconference, "The AIDS Dilemma: Confronting Fears with Facts" on January 23, 1986. The video addresses the special considerations of treating acquired immune deficiency syndrome (AIDS) patients in the hospital, including techniques for blood isolation, equipment handling, incident reporting, and emotional and professional interaction with AIDS patients.

Copies can be ordered for long-term lease from the American Hospital Association by calling (312) 280-6030. Callers should indicate their preference for 3/4" format (catalog no. 067656) or 1/2" format (catalog no. 067657). The cost is $50 to members and $300 to nonmembers. For more information, please call Melinda Ellis, Video Product Specialists, at (312) 280-6649.

Radiology postgraduate education courses offered

The University of California is offering the following radiology courses: "Diagnostic Radiology Seminars," to be held November 3-7, 1986, at the Maui Marriott Resort in Maui, Hawaii, and "Visiting Fellowships for Practicing Radiologists," an ongoing program available at the University of California.

For additional information, contact the University of California, Radiology Postgraduate Education, Room C-324, San Francisco, California 94143-0628, (415)-476-5731.

Continuing care accreditation program begun

The American Association of Homes for the Aging has launched a new national program for accreditation by the Continuing Care Accreditation Commission (CCAC). Accreditation will be granted to a continuing care retirement community (CCRC) that has been found by the CCAC to be effectively meetings its own mission, goals, and objectives and to be in compliance with the commission's published standards. The accrediting process has two purposes: assessment of quality and enhancement of quality.

All CCRC's are eligible for CCAC accreditation. A CCRC is defined by the commission as a community that offers a contract based on an entrance fee that includes independent living and various health care services that allow an individual to remain in the community for the remainder of his or her life

For more information about the accreditation program, call or write: American Association of Homes for the Aging, Continuing Care Accreditation Commission, 1129 20th Street NW., Suite 400, Washington, D.C. 20036, (202) 296-5960.

Business and medicine meeting planned

The Wilkerson Group, Inc. will hold its Eleventh Annual Symposium on Business and Medicine from September 17-19, 1986, at the Plaza Hotel in New York City. "Strategic Alliances in the Health Care Industry," this year's program, will focus on opportunities for creating competitive advantage through the development of strategic business alliances. Planned sessions will include: corporate venturing, marketing and distribution in the new environment, financing and legal issues, and unmet needs in medical specialties.

Among the speakers already confirmed for this year's Symposium is Dr. Steven A. Rosenberg, Chief of Surgery at the National Cancer Institute.

For more information, please contact Peter Horkitz, Symposium Coordinator, at (212) 753-8922.

System is developed for hospital innovation

Planned Management Innovation (PMI) is a process for developing and sustaining innovation in hospitals. PMI was developed and tested by the Center for Health Management Research of LHS Corporation (formerly Lutheran Hospital Society of South California) under a grant funded by the W. K. Kellogg Foundation of Battle Creek, Michigan. Seven hospitals from three multihospital systems participated in the "Innovations in Healthcare Management" demonstration project. Collectively they worked with more than 100 companies and successfully introduced and incorporated 16 new practices in marketing and human resources management.

The concept supporting PMI is simple: hospitals can benefit by adapting and incorporating management practices from other industries into their own organizational settings. The cornerstone of PMI is an exchange, or "networking" between health care providers and their counterparts in business and industry. Critical to PMI is the notion that management innovation can be planned and managed as part of hospital operations.

For more information about PMI, please contact the Center for Health Management Research, LHS Corporation, 1423 South Grand Avenue, Los Angeles, California 90025.

Competition concerns dominate opinion poll

Saga Corporation's Health Care Division has released the results of its Eighth Annual *Executive Memo* Opinion Poll. Two versions were conducted—one for acute care executives, the other for the continuing care marketplace. The Saga survey is distributed each February to more than 6,000 acute care executives and 600 continuing care executives across the United States who are subscribers to Saga's monthly digest of management trends, *Executive Memo*.

Responses from acute care executives outlined their concerns about changes in the traditional delivery and managment of health care amidst declining census, and the challenges brought on by growing competition. The poll revealed the accelerating usage of mass communication media such as television, radio, and billboards, as well as the urgency with which many hospital executives are pursuing affiliations with insurers. Many respondents reported expansion of their outpatient services and the application of market research to identify specific consumer needs. Productivity and efficiency continued to be critical issues for hospital executives, along with the growing need for productive medical/staff communications.

Although multihospital system participation has remained constant, the question of mandatory participation generated opposing views. Further, many executives raised the point that there are perceived benefits in belonging to more than one multihospital group. The poll summary also provided executives' reactions to multisystem services, hospital management groups, the cost-containment steps.

The responses of continuing care executives expressed concern for the economic climate of the industry and the accelerating competition, including that from multisystems. Reimbursement rates remained a major concern, coupled with a growing awareness of the acuity of newly admitted residents and patients. Many of the respondents predicted that self-pay care will accelerate. Public relations continued to serve as the primary marketing vehicle, augmented by the use of print advertising. Quality of care, a major marketing message in 1985, has been replaced by the "autonomy of residents" theme and "financial security" in 1986.

Additional information on the poll may be obtained from: Anne Murray, Director of Marketing, Saga Corporation, Health Care Division, 10 Tower Lane, Avon, Connecticut 06001, (203) 678-1023.

Certification program started for retirement housing managers

The American Association of Homes for the Aging (AAHA) has introduced a professional certification program for managers of housing facilities for the elderly. The AAHA program is open to qualified management professionals in all types of retirement housing, including independent living and congregate facilities, continuing care retirement communities, government-subsidized housing, cooperatives, and assisted-living homes.

Certification candidates must successfully complete three core courses that are designed to integrate management theory and practice with the unique requirements of serving elderly residents. These courses—"Administering the Retirement Housing Community," "Managing the Physical Environment," and "Management and the Aging Resident"—will be offered annually in various locations.

AAHA President William R. Thayer said the certification program "is designed to develop expertise in all aspects of managing housing, specifically for an aging population." The program also "establishes standards of excellence in practice that will measurably enhance the manager's or administrator's career status and opportunities."

For more information about certification and the dates and locations of upcoming core courses, housing managers should contact AAHA's Professional Development Institute, 1129 20th Street, NW., Suite 400, Washington, D.C. 20036.

Health care marketing books available

The Haworth Press has published two books relating to health care marketing. The first one, *Professional Practice on Health Care Marketing*, presents the proceedings of the National Health Care Marketing Symposium in Kansas City, February 1985, by the American College of Health Care Marketing. It includes the following topics: general issue topics in health care marketing, marketing tools in health care, marketing research, advertising, and marketing applications and case studies. Cost for this 224-page hardbound book is $34.95. The order number is B549. The second book, *Marketing Strategies for Human and Social Service Agencies*, includes information on general health care marketing and strategic marketing planning, marketing research and targeting, marketing strategies (marketing mix, positioning and salesmanship, select research cases), hospice care, parenting, and deinstitutionalization. Cost for this 157-page hardbound book is $22.95. The order number is 355.

The Haworth Press also publishes several journals that relate to the health care field. Of particular interest are: *The Journal of Hospital Marketing, Journal of Health Care Chaplaincy, Journal of Ambulatory Care Marketing, Health Marketing Quaterly, Home Health Care Services Quarterly, The Hospice Journal, Women and Health, Social Work in Health Care, Journal of Psychosocial Oncology, and Occupational Therapy in Health Care*. The *1986 Journals Catalog* provides overviews and ordering information on these and a wide range of other journals in a variety of areas.

To order the marketing books or request a free copy of the journals catalog, contact: The Haworth Press, Inc., 28 East 22 Street, New York, New York 10010-6194, (212) 228-2800.

Health delivery and management conference planned

Northwestern Memorial Hospital is planning a conference for April 1-3, 1987. "Patients and Purse Strings II" will provide the opportunity to explore measures supporting financial viability for hospitals, health maintenance organizations (HMO's), preferred provider organizations (PPO's), and other alternative health delivery and management systems. A call for abstracts has been announced.

Abstracts relevant to the theme should address one of the following areas: theory/conceptualization; research/applications research; projects/innovative approaches; planning and implementation; results utilization, cost accounting, budgeting, productivity, and quality assurance; and issues/problems with potential resolution.

Abstracts are invited from persons and agencies representing the wide range of health care delivery systems and related agencies, including but not limited to practitioners, researchers, academicians, consultants, hospitals, home care, ambulatory care, HMO's, PPO's, or public health.

For abstract submission form and additional information, contact: Nursing Staff Education, Northwestern Memorial Hospital, 215 East Chicago Avenue, Chicago, Illinois 60611, (312) 908-2216.

Health problems examined in historical context

Health Policies, Health Politics, The British and American Experience, 1911-1965, by Daniel M. Fox, explores the historical basis for many of the vexing problems of health affairs in Britain and the United States in the 1980's. The author purports that they are unanticipated consequences of a policy that, for the larger part of this century, seemed the best way to advance science and improve the health of the public.

Drawing on a wide range of sources, from popular literature, movies, and television drama to government and institutional documents, the book reveals similarities in the presumptions underlying British and American health policies. It also explores the distinctive way in which policy was shaped by political culture, class relationships, and economic resources in each country, and the resulting differences in the means each employed to achieve health care goals.

Costs of the 256-page book is $25.00. The order number is ISBN 0-691-04733-2. For information, contact Princeton University Press, 3175 Princeton Pike, Lawrenceville, New Jersey 08648.

Publications now available from NTIS

The following publications are now available from the National Technical Information Service, Document Sales, 5285 Port Royal Road, Springfield, Virginia 22151, (703) 487-4650:

Final Report on Alternative Methods of Developing a Relative Value Scale of Physicians' Services

This report presents the results of work completed during the second year of the Urban Institute's project, "Alternative Methods of Developing a Relative Value Scale of Physicians' Services." The first year's work was concerned primarily with the technical aspects of alternative methods of constructing relative value scales. Five basic methods were evaluated: charge-based methods, which build relative values from data on physicians' charges; the statistical cost function approach, which would derive relative values from the parameters of multiproduct cost function for physicians' services; time-based methods, which use data on the amount of time physicians spend performing various procedures; micro-costing and time/motion study methods, which use information obtained by detailed, on-site observation of the process of producing physicians' services; and consensus development/social preference methods, which rely on expert opinion and/or group decisionmaking to arrive at relative values. Order by accession no. PB86118379/AS; cost is $16.95 for paper copy, $5.95 for microfiche.

The Municipal Health Services Program: Improving Access While Containing Costs

Under the Municipal Health Services Program (MHSP), five city governments created networks of primary care clinics with a goal to serve populations with poor access to medical care who tended to receive fragmented care in public hospitals and clinics. The clinics were to provide care at lower cost than the population's alternative sources of care. Medicare and Medicaid waivers were also provided. The evaluation indicates that MHSP did reach most, but not all, of the targeted groups. MHSP successfully replaced some outpatient departments and emergency room services. However, some of the program goals of continuity and high patient satisfaction were not realized. Per capita costs of medical care for MHSP users were no more than for others, but not significantly less. However, for Medicare-eligible MHSP users, costs were significantly less. Order by accession no. PB86118346/AS; cost is $40.95 for paper copy, $5.95 for microfiche.

Hospital Rate Setting: Maryland's Experience, 1977-83

This final report has been prepared to explain the progress made involving the Maryland Health Services Cost Review Commission's rate-setting system from July 1, 1977, to the present. It begins with a background of the establishment of the Commission, its enabling legislation, and its responsibilities. It then describes the development of the rate-setting system and explains the system as it exists today. To give a better understanding of how the system has evolved, an explanation of the policies and the philosophies behind them as well as a description of the relevant legal cases is included. Other projects that have been instrumental in the system's development and those that will have strong influence on how it continues have been explained. The report concludes with graphs and charts comparing Maryland to the United States, other regulated States, unregulated States, and neighboring States to provide a basis for assessing the accomplishments of the Health Services Cost Review Commission. Order by accession no. PB85198539; cost is $16.95 for paper copy, $5.95 for microfiche.

Health Care Financing Program Statistics: Analysis of State Medicaid Program Characteristics, 1984

This report is published under the Program Statistics Series which provides information on Medicaid program operation and use. The report contains the following types of information on a State-by-State basis: State eligibility policies, service coverage and limitations, provider reimbursement policies; administration and finance characteristics; demographic, economic, and medical sector characteristics; and State-only programs. Order by accession no. PB86141289/AS; cost is $16.95 for paper copy, $5.95 for microfiche.

Grants and Contracts Report: A Decade of Medicaid Experience, Fiscal Years 1973 Through 1982

This report is from the Grants and Contracts Series which features final reports from extramural projects funded by the Office of Research and Demonstrations. It provides analyses of Medicaid expenditure trends and the differences in growth of particular services, by eligibility class and by State, for the period 1973-82. The contextual influences (such as the general inflation in medical cash prices) and changes in program characteristics as they relate to recent and longer-run expenditure trends are also discussed. The possible links between the dramatic slowdown of Medicaid expenditure growth in 1982 and specific program changes by Federal and State governments receives special attention. Order by accession no. PB86137288/AS; cost is $16.95 for paper copy, $5.95 for microfiche.

Anniversary issue on Medicare and Medicaid program published

The 1985 Annual Supplement of the *Health Care Financing Review* commemorates the 20th anniversary of Medicare and Medicaid. The issue provides a forum for discussing the impact of Medicare and Medicaid on beneficiaries, the providers of services, and the Government, as well as future directions for the program. A range of viewpoints from national leaders and experts in the fields are presented. Also featured are an overview article that presents basic data about the two programs and an article that provides a legislative perspective on the history and social and political context in which these landmark programs were conceived. Single copies of this special issue may be ordered from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The cost is $4.25 per copy.

Statistical components handle inquiries

Inquiries regarding the availability of statistical information other than those pertaining to the specific contents of articles in the *Health Care Financing Review* should be directed to the following components:

For Medicare Statistics

Statistical Information Services Branch
Office of Statistics and Data Management
Bureau of Data Management and Strategy
Room 1-F-2, Oak Meadows Building
6325 Security Boulevard
Baltimore, Maryland 21207
Telephone: (301) 594-6705

For Medicaid Statistics

Division of Medicaid Cost Estimates
Office of Actuarial Analysis
Office of the Actuary
Room 1-K-1 Equitable Building
1705 Whitehead Road
Baltimore, Maryland 21207
Telephone: (301) 597-6107
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Research agenda

The Health Care Financing Administration (HCFA) is responsible for the Medicare program, Federal participation in the Medicaid program, and other health care quality assurance programs. Within HCFA, the Office of Research and Demonstrations (ORD) directs more than 300 intramural and extramural projects that study, demonstrate, or evaluate optional reimbursement, coverage, eligibility, and management alternatives to the Federal programs. ORD also assesses the impact of these programs on health care status, utilization, and expenditures, as well as their effect on beneficiary access to services, health care providers, and the health care industry.

ORD has funds available for research and demonstration grants, cooperative agreements, and contracts. These are used for projects that will help resolve major health financing and program issues or develop innovative methods for the administration of the Medicare and Medicaid programs.

To make all potential applicants aware of ORD's research and demonstration requirements, two vehicles are employed: (1) an announcement in the *Federal Register* for research and demonstration grants and cooperative agreements; and (2) advertisements in the Commerce Business Daily for contracts. A contract is used whenever the agency decides in a specific instance that the use of a procurement contract is appropriate. Both grants and cooperative agreements are considered "assistance" instruments/awards. The difference between a grant and a cooperative agreement lies in the amount of programmatic involvement expected between HCFA and the awardee.

ORD's research agenda reflects a balanced approach to focusing on short-term (0-2 years), mid-term (3-5 years), and long-term (6-10 years) issues. In our study of short-term policy issues, we will be continuing our efforts at refining the current Medicare hospital prospective payment system and physician payment methodology. We will also be continuing our assessment of the impact of the Medicare hospital payment system on segments of the health care delivery and financing system, especially on access to and quality of care provided to Medicare beneficiaries. For mid-term policy issues, we will increasingly be directing our efforts to designing and beginning to test alternative payment methods for services that will increase competition in the health care marketplace, while ensuring continued quality of care. Most notably, we will be studying the feasibility of capitated systems (particularly where a union/employee organization or employer assumes the risk for benefits provided to their Medicare retirees; or where partial capitation—such as for all Medicare Part B services—is the method of payment for services), as well as the feasibility of setting payment for Medicare services on a competitively bid basis. We will be expanding our efforts geared at ensuring that quality health care remains accessible to beneficiaries, particularly as the nature of the payment system changes. We will be directing our efforts at studying the impact that providing preventive services to individuals has on their current and future utilization of health care services. We will also be looking at the longer range impact of program changes on segments of the health care delivery and financing system. Finally, for long-term policy issues, we will be focusing on major structural changes to the payment and delivery systems under the Medicare and Medicaid programs.

Subject areas that will be given priority include: alternative payment systems, quality of care, physician payment, hospital payment, beneficiary awareness and prevention, program analysis and refinements, and State programs for long-term care. Unsolicited applications for projects related to health financing issues as well as administration of Medicare and Medicaid and other program concerns also may be submitted. If the need arises for unique research requirements, special solicitations may be announced in the *Federal Register* out of cycle. One such special solicitation is for projects testing the cost effectiveness of providing preventive services to Medicare beneficiaries, as required by section 934 of the Consolidated Omnibus Budget Reconciliation Act of 1985.

For grants and cooperative agreements, most awards range from $35,000 to $275,000 per year and are funded for 1 year at a time. Funding may be continued on a noncompeting basis for up to 3 years if an application is originally approved as a multiple-year project. Detailed information about the priority areas, project requirements, application procedures, funding and duration of awards, closing dates and processing time, and the criteria for technical review and selection is published in the *Federal Register*. The closing date for the fiscal year 1987 cycle is November 3, 1986.

A reprint of the *Federal Register* notice for the current cycle and additional information may be obtained by writing to: Health Care Financing Administration, Office of Research and Demonstrations, Office of Operations Support, Room 2226, Oak Meadows Building, 6325 Security Boulevard, Baltimore, Maryland 21207. Application kits may be obtained from: Paul McKeown, Health Care Financing Administration, Office of Management and Budget, Administrative Contracts and Grants Branch, Room 364 East High Rise Building, 6325 Security Boulevard, Baltimore, Maryland 21207-5187, (301) 594-3333.

Administrator's Decisions

Under Section 1878(f) of the Social Security Act, as amended, a Provider Reimbursement Review Board (PRRB) decision is final unless the Secretary, Department of Health and Human Services, on his own motion, and within 60 days after the Provider is notified of the Board's decisions, reverses, affirms, or modifies the Board's decision. The review function has been delegated to the Administrator/Deputy Administrator of the Health Care Financing Administration.

The two indexes are lists of the Administrator's decisions rendered on review of PRRB decisions and of PRRB decisions the Administrator elected not to review. These indexes are in numeric order by PRRB decision number. They also state the name of the provider, issues involved, and date of Administrator's action.

Numeric index of Administrator's final decisions rendered on review of PRRB decisions—January 1, 1986 through March 31, 1986

86-D19	*Rancho Los Amigos Hospital*—Patient library services (01/03/86)
86-D21	*St. Francis Hospital and Medical Center*—Reclassification of costs: Bad debts; Collection agency fees (01/08/86)
86-D22	*Mercy General Hospital*—Labor/delivery room days (01/03/86)
86-D23	*St. John's Hospital*—Emergency room clerk costs; Cafeteria meals (01/15/86)
86-D24	*Los Angeles County Hospital*—Labor/delivery room days (01/16/86)
86-D26	*Homemakers North Shore, Inc.*—Cost limits exception (01/21/86)
86-D28	*P.I.A. Asheville, Inc.*—Stock purchase; Interest expense (01/21/86)
86-D29	*Los Angeles County Hospitals*—Labor/delivery room days (01/23/86)
86-D30	*Community Medical Center Hospital*—Interest income; Useful life of building addition; Useful life of fixed/movable equipment; Vendor contributions (01/30/86)
86-D31	*Los Angeles County Hospitals*—Labor/delivery room days (01/23/86)
86-D32	*Associated Hospital Systems*—Labor/delivery room days (01/28/86)
86-D33	*Los Angeles County Hospitals*—Labor/delivery room days (01/23/86)
86-D34	*Archibishop Bergan Mercy Hospital*—Interest expense; Public relations expense; HIll-Burton; Return on equity; Special care unit (01/31/86)
86-D35	*Visiting Nurse Association of Morris County, Inc.*—Pension fund assets (01/31/86)
86-D37	*Sierra Medical Center*—Standby costs; Routine cost limits (02/07/86)
86-D39	*Baptist Medical Center Skilled Nursing Facility*—Employee annunities; Interest and penalties; Malpractice insurance (02/10/86)
86-D40	*Baptist Medical Center of New York*—Employee annunities; Interest and penalties; Malpractice insurance (02/10/86)
86-D41	*Kingsbrook Jewish Center Group Appeal*—Accrued sick pay (02/19/86)
86-D42	*Presbyterian Hospital in the City of New York*—Autopsy costs; Return on equity capital (02/18/86)
86-D43	*Marin General Hospital*—Radiology billing; Emergency room physicians' billing (02/24/86)
86-D45	*Bethesda Memorial Hospital*—Accrued sick pay; Tax collector fees; Legal fees; Consultant fees; Labor/delivery room days (02/24/86)
86-D46	*Jewish Institute for Geriatric Care, Inc.*—Routine cost limits; Laundry expense (02/24/86)
86-D48	*Westbrook Park Nursing Home, Inc.*—Atypical nursing service costs (03/10/86)
86-D49	*Senatobia Community Hospital*—Lease payments (03/07/86)
86-D50	*Community Health and Counseling Services*—State-paid homemakers costs (03/07/86)
86-D51	*Sioux Valley Hospital*—Labor/delivery room days (03/12/86)
86-D52	*West Essex Community Health Services*—Private aide bathing services (03/12/86)

Numeric index of Administrator's election to decline review of PRRB decisions—January 1, 1986, through March 31, 1986

86–D20	*Biloxi Regional Medical Center*—Related organizations (01/02/86)
86–D25	*Jersey Shore Medical Center*—Interest investment income; Funded depreciation (01/02/86)
86–D27	*Rogers Park Home Health Center, Inc.*—Administrator's compensation; Legal fees; Accounting fees (01/03/86)
86–D36	*Jackson Osteopathic Hospital*—Interest income (01/17/86)
86–D38	*Greene County General Hospital*—Accrued sick pay (01/15/86)
86–D44	*The Methodist Hospital*—Malpractice self-insurance; Transporter costs (02/19/86)
86–D47	*VNA of Greater St. Louis*—Continuing care consultants; Executive compensation; Conferences, club dues and expenses (02/20/86)
86–D53	*Mission Hospital of Huntingon Park*—Malpractice insurance costs (02/12/86)
86–D54	*Community Hospital of Huntingon Park*—Malpractice insurance costs (02/12/86)
86–D56	*Arnot-Ogden Memorial Hospital*—Revenue/cost offset; Tel-med costs (03/07/86)
86–D57	*St. Lukes Hospital*—Allowable costs (03/07/86)
86–D58	*Modesto City Hospital*—Medical records costs (03/07/86)

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Penelope L. Pine, is a statistician in the Division of Program Studies, Office of Research and Demonstrations, Health Care Financing Administration. She has been involved with analysis of the Medicare program since its inception. She is currently participating in the management of the Medicaid Tape-to-Tape Project which is developing a uniform Medicaid person-based data set for five States.

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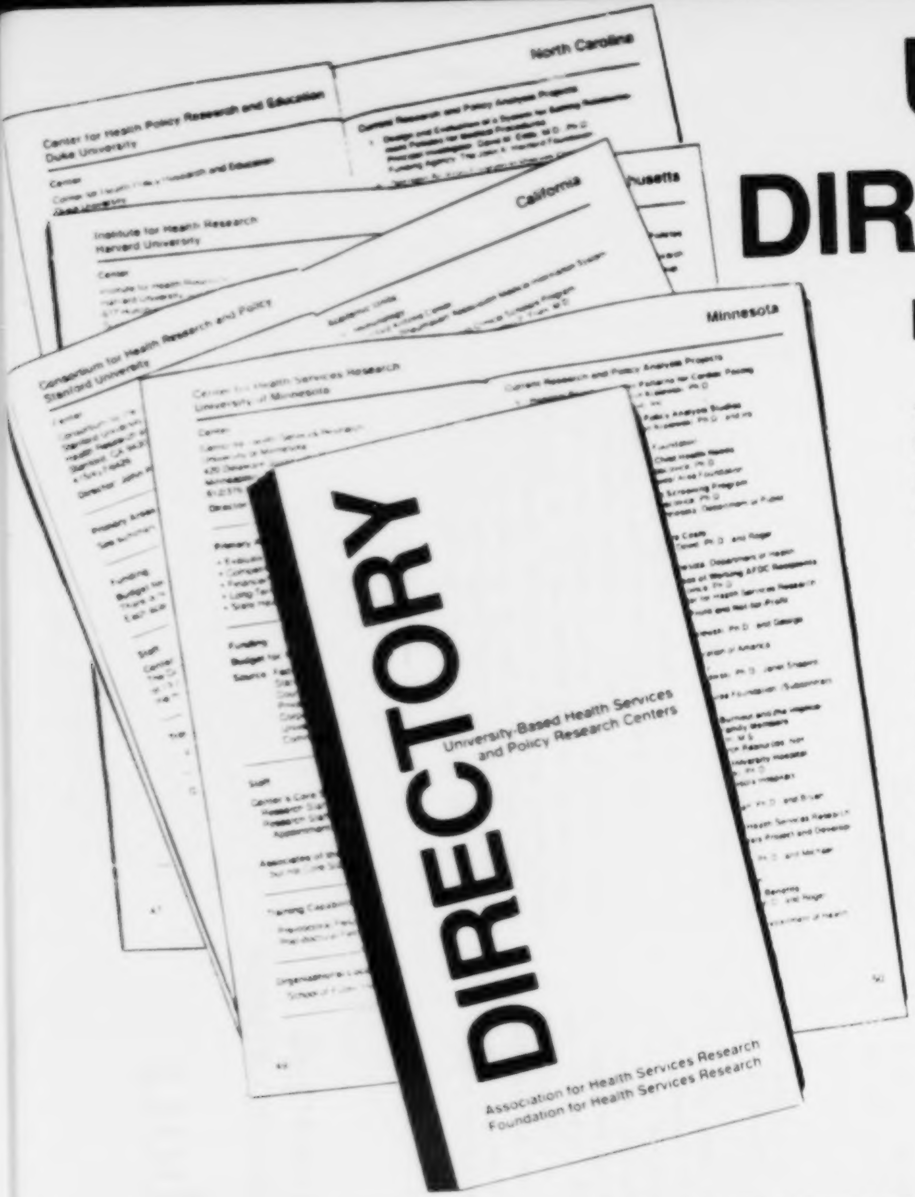
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January 1986 Edition

The Office of Research and Demonstrations (ORD), Health Care Financing Administration (HCFA), directs more than 300 research, evaluation, and demonstration projects. A central focus is on program expenditures as they relate to reimbursement, coverage, eligibility, and management alternatives under Medicare and Medicaid. Study activity examines program impact on beneficiary health status, access to services, utilization, and out-of-pocket expenditures. The behavior and economics of health care providers and the overall health care industry are also topics of investigation.

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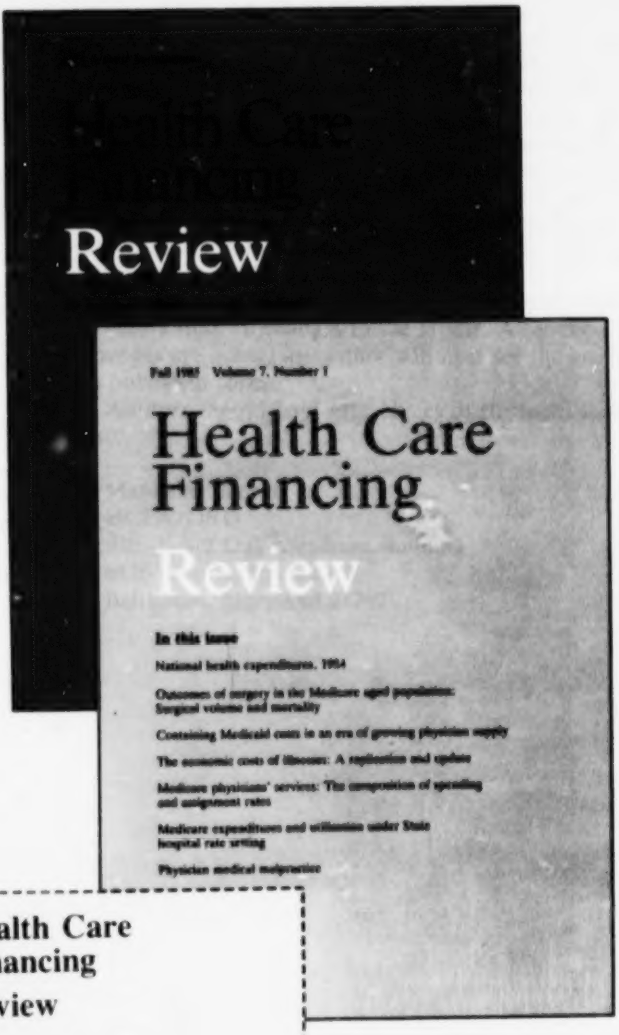

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Information for authors

The *Health Care Financing Review* welcomes potential articles from readers. Papers to be considered for publication should discuss health care research, policy, the development of a particular project or demonstration, or any other subject which the author thinks would interest the *Review* audience. This audience comprises Congress, Federal, and State and local officials, as well as health care providers, insurers, planners, and researchers.

The by-line should cite those who have contributed significantly to the work; those who have participated only in an advisory or supporting capacity should be thanked in the Acknowledgments.

The author submitting an article should state in a cover letter that the content and wording in the acknowledgment have been approved by those mentioned. We regard this precaution as essential because thanking colleagues for their help may be interpreted to mean that they approve of the article. If they do not, they may object to being mentioned.

Each article should begin with an abstract of 100 words or less. The abstract should acquaint the prospective reader with the essence of the text by presenting, very briefly, the essential points made in the article. It should be intelligible when divorced from the article and devoid of any undefined abbreviations.

Articles should be approximately 25 to 35 doublespaced typed pages, including up to a maximum of 10 tables and figures; the *Review* cannot reproduce photographs. All tables, charts, and other art should be clear without reference to the text. They should be individually and succinctly titled; their footnotes should be keyed with numbers rather than symbols. Tables should not have vertical lines or leaders. All art should be black and white only.

References within the text should consist of the author's name and the date of publication, within parentheses. Anything attributed to another author is a reference, not a footnote; the two should be clearly distinguished. Complete references should be listed in alphabetical order by author at the end of the paper. Additionally, the author should state in the cover letter that the content and wording of references to unpublished work have been approved by the person(s) whose work is quoted. That person's current address should also be given.

Footnotes should be numbered sequentially throughout the article. Any information that expands on or explains the text should be footnoted.

All submitted manuscripts will be reviewed by the Executive Editor for their relevancy to the health care financing field. Articles of interest will be referred to the Associate Editors and subject-matter experts for peer review, and their comments will be forwarded to the authors. Authors whose manuscripts are accepted for publication will be required to make revisions based on these critiques. Authors whose articles are accepted for publication are given 3 days in which to look over the galley proofs of their articles. Discounting typographical errors, authors may make no more than 10 changes to the article. After these changes are made, the author will next see the article in published form.

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